

The Iron Age

A Review of the Hardware and Metal Trades.

Published every Thursday Morning by DAVID WILLIAMS, No. 10 Warren Street, New York.

Vol. XV: No. 20.

New York, Thursday, May 20, 1875.

\$4.50 a Year, Including Postage.
Single Copies, Ten Cents.

Gear Cutting Attachment for Lathes.

A gear cutter is a tool which almost every shop ought to have, but owing to the fact that ordinary gear cutting engines are large and expensive, they are very much less in use than they should be, and in our smaller shops, and, in fact, in many of the more important, we have to be content with cast gears, unless we can send our castings away to be cut. Except in the largest shops, or those having a special line of work, there is commonly not work enough to justify the expense of one of the complete machines. The attachment which we illustrate, and which is made by the New York Steam Engine Company, No. 98 Chambers street, enables one to convert the ordinary lathe into a machine which will cut all sorts of gears. It consists of a cutter fixed on an adjustable spindle which also carries a gear that meshes into a carrying gear driven by bevel gears, one of which is on the driving shaft carried by a driving pulley, the carrying gear and pulley partially rotating around the clamping screw post, the whole being set in a proper frame work and clamped to the tool carriage of the lathe. The index plate is made the full diameter of the swing of the lathe, and is held in position by a simple and substantial lever, the plate being made fast to the face-plate of the lathe, and drilled in a suitable manner for all ordinary pitches.

Beside cutting gears of the usual kinds, it will cut spur wheels of any width of face, or fluted rollers. It will cut splines or key-ways on shafting, and do the work accurately. The sizes are adapted to lathes of from 20 to 50 inches swing, but can, by the use of washers, be used on any larger size if desirable. Unless otherwise ordered, these attachments are made to fit the lathes manufactured by the company.

The Law of Trade-Marks and Their Analogues.

BY ROWLAND COX, ESQ.

IV.

In a large proportion of the adjusted cases the question of infringement has been the controlling one, and is, probably, of more interest and of greater practical importance than any other that can arise. It may be justly regarded as, in the main, free from serious difficulty, although its nature is such that it cannot be absolutely controlled by any exact rule. Every case must be, in some measure, governed by its own facts, and the application of accepted doctrine and precedent made to depend upon the circumstances that surround it.

If there be a rule deducible from authority, it may be stated as follows: *Wherever there is a possibility of deception and an intent to deceive, there is infringement.* I am aware that this is a very radical view, which will seem to excite controversy; but it is founded in the most authoritative English adjudications, and is coming to be the recognized doctrine of the American courts. It is undoubtedly true that some of our inferior courts have, in numerous recent instances, decided cases apparently upon the assumption that the rule of law was otherwise. Indeed, several of them have, in effect, directly controverted any theory that supports this view. But when the decisions of the higher tribunals are examined, it will be found that they are, with a very few exceptions, pronounced recognitions of the rule as above stated; and it will also be found that the most recent opinions are essentially progressive in their character, clearly tending toward the only doctrine that can afford a full protection, and the only natural resting place of the subject.

The first American case of moment that involved a discussion of the question of infringement was that of *Partridge vs. Menck*, decided by the court of last resort of New York in the year 1848. Unfortunately, the conclusion arrived at was one by which nearly any colorable evasion may be justified; but it was speedily followed by the masterly opinion of Judge Duer, in the well known Amoskeag case, wherein he announced a different doctrine, and established a precedent that has since—theoretically, at least—been of binding force. After a careful examination of the cases, the learned judge thus expresses his convictions:

"In the imitation of the original marks upon an article or goods of the same description, the name of the proprietor may be omitted; another name, that of the imitator, may be substituted; but if the peculiar device is copied, and so copied as to manifest a design for misleading the public, the omission or variation ought to be wholly disregarded." * * An injunction ought to be granted whenever the design of a person who imitates a trade-mark, be his design apparent or proved, is to impose his goods on the public as those of the owner of the mark, and the imitation is such that the success of the design is a probable—or even possible—conclusion."

Without wearying the reader with an enu-

meration of the subsequent cases, it will suffice to state that this view was, substantially, approved in a number of New York decisions, and very cordially endorsed by the Supreme Courts of Connecticut and other States; while the doctrine of *Partridge vs. Menck* was returned to in only a single notable instance of quite doubtful effect. The latest opinions, however, have added to the certainty of the weight of authority, and will show that the language of Judge Duer is the law, as it obtains to-day.

The Supreme Court of Connecticut, in the latest reported decision, states the theory of the rule as follows:

"The fact that careful buyers, who scrutinize trade-marks carefully, are not deceived, does not materially affect the question. It only shows that the injury is less, not that there is no injury. No amount of diligence on the part of the petitioners will guard against this injury. An injunction is their only adequate remedy." *Meriden Brit. Co. vs. Parker*, 39 Conn. 460.

The latest New York case, that of *Lea vs. Wolff*, is equally positive in the affirmance of the same doctrine. Delivering the opinion of the Supreme Court at general term, Judge Fancher writes:

"The adoption of the very words contained

infringement resolves itself into a question of the defendants' intention."

When the English precedents are added to the American, it would seem that there can be no mistake about the correctness of the rule above laid down. But, as intimated, the rulings of the inferior courts appear to keep it in an unsettled form. The reason is, probably, that the question is a mixed one of fact and law, the judge inquires, not whether an incisive purchaser would be misled, but whether he would himself fall into error. And as, happily, most of our judges are cautious men, they reach the conclusions stated, losing sight of the fact that the infringer purposely addresses only those whom accident or misfortune has rendered credulous and unwaried.

In applying the rule it is only necessary to compare the two marks. In almost every instance the artifice is readily detected, as the wrong doer is compelled to adhere to the *tout ensemble* of the original in order to carry out his nefarious purpose. But in presenting a case to a court it is of the utmost importance that the effect of the simulation be shown by the most conclusive evidence. Unless this is done, there is great danger of the defendant creating sufficient doubt to throw the scales in his favor, even if the case be a very clear one within the rule as above laid down.

gauge, for cans holding from 15 to 50 gallons. The advantage of having the bottom hoop and the bottom all in one piece is that the strain produced by the weight never comes upon the rivets, but upon the shoulder which is rolled on the inside of what might be called the chime hoop. This latter is made from a shape rolled to order; it is rolled and riveted together as well, and driven on to the bottom. The inside seam, of course, is perfectly protected. At first, country workers were greatly averse to the adoption of these bottom hoops and bands, because they derived a pretty good income from the repair of cans alone, and the new trimmings would entirely cut off that source of revenue. It was found, however, that there were about ten of the new style of cans sold to one of the old, and the profit of the manufacture was much more than the small repairs of the old cans. Now, as far as our observation goes, the majority perhaps of the large cans made are with trimmings of this sort. In large cans it is almost impossible to keep the bottom tight where the common seamed joint is used. One of the most recent improvements is corrugating the hoop that surrounds the middle of the can. This is now swaged up so that it is very stiff and strong, and being of heavy iron lasts much better than the plain hoop formerly

used for shipping purposes, the general features of the milk can are retained, but so modified as to be applicable to the use to which they are to be applied. The company put up a great variety of black goods, and re-tin them, by which the expense of soldering is saved and a better article produced at a lower price than could be obtained in the ordinary method of manufacture.

Moistic Iron.

A recent Treasury decision revives interest in a subject which well illustrates the necessity of constant vigilance by the iron manufacturers of the country in guarding their interests from hostile influences. On the 17th of March the Secretary of the Treasury decided that the Collector of Customs at Ogdensburg, New York, was right in assessing a duty of one and a half cents a pound, less 10 per cent., on certain Moistic iron blooms, imported from Canada, March 2, and refusing to allow them to be entered as pig iron at \$7 a ton, less 10 per cent. The Secretary said:

"The 6th section of the act of February 7, 1873, having placed Moistic iron in the same category for assessment of duty as all other iron, the only question to be determined in this case is, whether the said iron is more advanced than pig iron. On this question it appears that the iron is not known by the designation of iron in pigs, but is invoiced, and is commonly known, bought and sold as iron in blooms (a stage of manufacture in advance of pig iron), and therefore is liable to duty at the rate prescribed for 'iron in bars,' as assessed under the provision in 'schedule E,' which is as follows: 'But all iron in slabs, blooms, loops or other forms less finished than iron in bars, and more advanced than pig iron, except castings, shall be rated as iron in bars, and pay duty accordingly.'

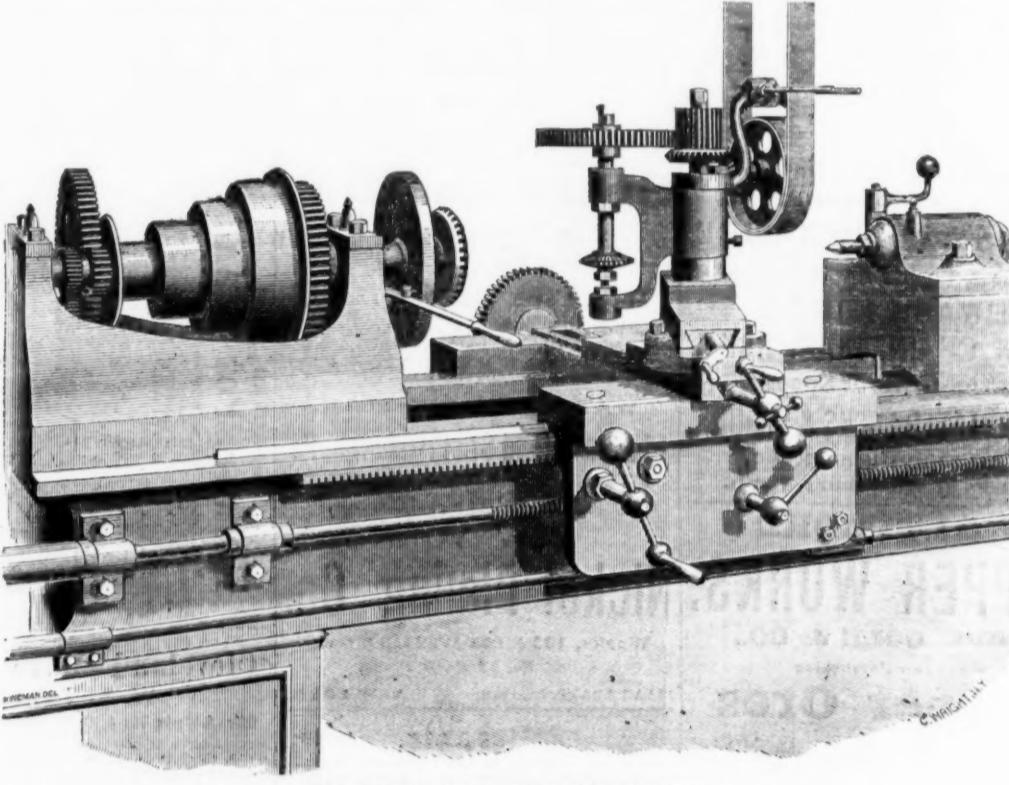
Moistic iron is made in Canada, on the north side of the Gulf of St. Lawrence, from a fine black sand, lying about three feet below the ordinary beach sand, and containing over 63 per cent. of metallic iron. A forge with eight fires converts this ore into a very fine quality of iron blooms, which are equal to the best Swedish and Russian charcoal bar and hammered iron for the manufacture of the best cast steel, and come into direct competition in our market with the product of our Lake Champlain forges and with other steel irons. The blandness which could demand that these Moistic blooms should be admitted into our ports as pig iron is most remarkable, but it is thrown completely into the shade by the innocence of a member of Congress, who, not very long ago, standing on the floor of the House of Representatives, held up in his hands the ragged end of one of these blooms and stated that it was only so much pig iron—that is, iron in a primary stage of manufacture, and was therefore entitled to pay duty as pig iron and not as a more advanced product. At the time this statement was made the iron in question was worth twice the value of the best imported pig iron.

The tactics which represented Moistic iron to be pig iron were so far successful as to induce Congress, by the act of 6th June, 1872, to fix the duty at \$15 a ton, which was less than half the duty of 1½ cents per pound, less 10 per cent., imposed on iron of similar quality imported from Sweden and Norway. But this concession did not satisfy the parties interested in the manufacture of Moistic iron, and accordingly, in the winter of 1873-4, they asked Congress to reduce the duty to \$6.30 a ton, the amount then levied on pig iron. Nothing was done in the way of tariff revision at that session; but in January last Congress passed, and on February 7th the President approved an act, known as the "little tariff bill," the sixth section of which reads as follows:

"That section 4 of the act entitled 'An act to reduce duties on imports and to reduce internal taxes, and for other purposes,' approved June 6, 1872, be and the same is hereby amended by striking out the thirtieth paragraph of said section in relation to the duty on Moistic iron, and from and after the passage of this act the duty on of Moistic iron, whatever condition, grade or stage of manufacture, shall be the same as on all other species of iron of like condition, grade or stage of manufacture."

To the mind of the Moistic iron manufacturer this section placed his blooms in the same class with pig iron, paying \$7 a ton, less 10 per cent., but to the mind of the Secretary of the Treasury it placed the blooms in the same class with iron in bars, paying 1½ cents a pound, or \$3.60 a ton, less 10 per cent.—quite a difference!

Between the date of the approval of the "little tariff bill" (February 7th), and the approval of the "tax and tariff bill" (March 3d), the above duties, \$7 and \$3.60 respectively, less 10 per cent., were in force. By the terms of the last named act the 10 per cent. reduction was abolished. This explanation accounts for the fact that the Collector of Customs at Ogdensburg was asked to assess a duty of \$7 a ton, less 10 per cent., on Moistic iron imported March 2d, and was sustained in his decision to assess a duty of 1½ cents a pound, less 10 per cent. The duty on this iron since March 3d is 1½ cents a pound.—*Bul. J. and S. Ass'n*.



GEAR CUTTING ATTACHMENT FOR ENGINE LATHE.

in the plaintiffs' trade-mark, and the imitation in colors, size, language and appearance of their labels and wrappers, are irresistible proof of an intention of the defendants to deceive the public and to lead purchasers to suppose that the defendants' preparation was the original Worcester sauce, so long manufactured by the plaintiffs. Where such an intention exists, the defendants should not be protected in their fraudulent imitation by the pretence that in the words employed the name of a place and the word descriptive of the article only are used. * * * The essence of the wrong is the false representation and deceit. When the improper design is apparent an injunction should be issued."

Thus it will be seen that the higher American courts are to be regarded as fairly committed to a rule that is tantamount to that above laid down.

The English cases are unmistakably clear, and directly to the same effect. In the latest, decided by the House of Lords, Lord Chelmsford said:

"For the purpose of establishing a case of infringement it is not necessary that there has been the use of a mark in all respects corresponding with that which another person has acquired an exclusive right to use, if the resemblance is such as, not only to show an intention to deceive, but also such as to be likely to make unwary purchasers suppose they are purchasing the article sold by the party to whom the right to use the trade mark belongs."

And in his work on trade-marks Mr. Ludlow uses the following language:

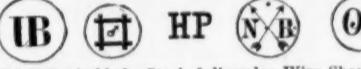
"It happens, however, in the larger number of cases, that the infringement is intentional, and perpetrated with the view of defrauding the public. A court of justice, when this is established, naturally gives the wrong-doer the credit of doing something that had a tendency to effect the object he had in view, and seldom, if ever, stops to inquire whether the imitation is so clumsy as to be calculated to mislead no one. So that very often the question of in-

fringement is reduced to a question of the defendants' intention. Few people except those directly connected with the tin and milk trades of the country have any idea of the immense quantity of cans required in handling and transporting milk. Until within a comparatively recent date, the ordinary can made from heavy tin plate was all that was used in the milk business. The almost numberless faults which such cans had, and the severe service to which they were exposed, was a very great hindrance to the prosperity of the trade. Among the faults of the large cans used in dairies was the wear of seams, starting of joints, bending of parts, and a general weakness which no amount of skill on the part of the tinman could remedy. The 'Iron Clad Can,' made by the Iron-Clad Can Co., 23 Cliff street, N. Y., which has been in the market some years, has, as it were, not only revolutionized the milk can trade, but is making great strides toward revolutionizing cans, casks, etc., in general used for packages. To trace the history of the 'iron-clad can,' and the inventions pertaining to it, as well as the operations through which it passes, would be of great interest, but space is not sufficient to treat of this at length. Some of the points of the can are these: The bottom is struck up out of a heavy piece of metal, and has a rim turned up around the edge, lapping upon the side of the can. Outside of this bottom is a ring having a ledge on its inside, upon which the bottom rests. The body of the can slips down inside the flange, or rim, upon the bottom, and is soldered fast, both outside and in. The bottom joints being thus protected, and the bottom hoop, which forms a chime, being perfectly secure, the can has a strength which can be no better expressed than by the word iron-clad. The demand for these cans is something very enormous, and as the company sell the trimmings, as well as the cans complete, the whole tin trade has gone into the manufacture. The bottoms for what are known as the Factory Milk Can are made of Nos. 16 and 18 iron, American

used. The floating cover, so essential in large cans for preventing the milk from churning in transportation, is now struck up from a single piece of metal. We saw samples of these on a recent visit to the factory, some of which were six inches deep, with perfectly straight sides and no flare, and twenty inches in diameter. This is a great improvement over the old plan of making floating covers, because the seams were always wearing and working, and as soon as there was the least chance for the escape of air the cover would sink. The new cover being made from a single piece of metal, has no joints or seams to leak, and is very much liked on this account.

One of the most serious difficulties which the company encountered was the impossibility of getting tin plate of the size required for the work, because a great deal of their work required odd sizes, and to obtain these, large orders must be given, and to the same time the prices asked were enormous while the delays and trouble of getting them were very great. These reasons induced the company to begin the manufacture of tin plate in odd sizes. If we are not mistaken this company is the first that in this country has turned out the plate equal to the best imported. They are now filling orders for all odd sizes of plate up to something like 36x48 inches, at rates below the foreign prices of the same goods. In quality, the plates which we have seen show that the American article is in every respect equal to that which is imported, both in finish and quality. During the present season the company intend to make such additions to their works as will enable them to produce plates very much larger than those mentioned. The advantages of having the plate of the exact size needed for the work in hand, is one which all tin workers will appreciate.

In addition to the milk cans, the company produce a large variety of cans for other purposes, applying, however, the same principles of construction to them all. Thus in cans for shipping oil, for holding kerosene, and for gen-

Iron.	Iron.	Iron.	Iron.	Iron.
NEW YORK.	NEW YORK.	NEW YORK.	NEW YORK.	NEW YORK.
OGDEN & WALLACE, Successors to GAM'L G. SMITH & CO., IRON WAREHOUSE, 55, 57, 59 and 91 Elm Street, New York. (One block below Canal Street.) Importers and Dealers in	C. HUERSTEL, (Successor to CONKLIN & HUERSTEL.) IRON AND STEEL. WAREHOUSE, 99 Market Slip, N. Y. IRON and STEEL of all kinds Constantly on Hand. Horse Shoe Iron & Nails, Norway Iron, Cast, Spring, Toe Calk, & Bessemer Steel Tire. Also, SPRINGS, AXLES and BOLTS, For Truck and Carriage Makers.	T. D. HAZARD, Successor to HAZARD & JONES, BROKER IN NEW & OLD RAILS, Foreign and Domestic PIG IRON, Wrought and Cast Scrap Iron AND GENERAL METALS, 204 Pearl St., New York.	HARRISON & GILLOON IRON AND METAL DEALERS, 558, 560, 562 WATER ST., and 302, 304, 306 CHERRY ST., NEW YORK, have on hand, and offer for sale, the following: Scotch and American Pig Iron, Wrought, Cast and Machined, Scrap Iron, Car-Wheels, Axles and Heavy Wrought Iron; also old Copper, Composition, Brass, Lead, Pewter, Zinc, &c.	PETTEE & MANN, Dealers in Ulster, English Refined & Common BAR IRON, Scotch and American Pig Iron, Wrought & Cast Scrap Iron, &c., &c., 228 & 229 South and 449 & 451 Water Sts., N. Y. The highest price paid for Wrought and Cast Scrap Iron. Storage for Pig, Bar and Railroad iron taken at the lowest rates. D. L. PETTEE.
IRON AND STEEL, Common & Refined Bar Iron, SHEET AND PLATE IRON, Rod, Hoop, Band, Scroll, Horse Shoe, Angle and Tee Iron, PIG IRON, OLD RAILS, WROUGHT IRON BEAMS. Iron of all sizes and shapes made to order.	WM. GARDNER'S SONS. SUCCESSORS TO WM. GARDNER, 575 Grand, 414 Madison & 309 Monroe Sts. Bar, Hoop, Rod, Band and A. W. Horse Shoe Iron. BEST NORWAY N. R. AND SHAPES. Spring, Toe Calk, Tire & Sleigh Shoe Steel. Manufacturers and Proprietors of PATENT BOLT HEADER.	JAMES WILLIAMSON & CO., SCOTCH AND AMERICAN PIG IRON, No. 69 Wall St., New York.	OXFORD IRON CO., Cut Nails and Spikes, R. R. Spikes, Splice Bars and Nuts and Bolts, 81, 83 & 85 Washington, near Rector St., N. Y.	PENNNSYLVANIA IRON WORKS. EVERSON, MACRUM & CO., Pittsburgh, Pa., Manufacturers of every description of Bar, Sheet and Small Iron, Make a specialty in Fine and Common Sheet Iron.
PIERSON & CO. Iron Warehouse, 24 Broadway, 77 & 79 New St., NEW YORK CITY.	U. O. CRANE. BROKER IN PIG IRON & METALS, 104 John St., New York.	JOHN W. QUINCY, 98 William Street, New York Dealer in Anthracite & Charcoal Pig Irons, OLD SCRAP and CUT NAILS. Gibbs' Patent Lock Nut and Washer, and Pitch Plates for Rail Roads.	HENRY CONKLIN, (Late of the Firm of Conklin & Huerstel.) Commission Merchant in IRON and STEEL, SCRAP IRON BOUGHT AND SOLD, Horse Shoe Iron a specialty. 212 Broadway, N. Y., (Room 4.)	W. P. TOWNSEND & CO., Manufacturers of WIRE and Black and Tinned Rivets OF CHOICEST CHARCOAL IRON. Rivets any diameter up to 7/16 inch and ANY LENGTH required. 19 & 21 Market St. PITTSBURGH PA.
IRON and STEEL, Agents for JOHN A. GRISWOLD & CO'S Bessemer Steel. MACHINERY STEEL, Cast Steel and SPRING STEEL, ANGLE and T IRON. Special Irons for Bridge and Architectural Work.	Eureka," Pennocks, "Wawasset," Lukens, Brands of Iron. Also all descriptions of Plate, Sheet, and Gasometer Iron. Special attention to Locomotive Iron. Fire Box Iron a specialty.	JEVONS, STROUD & CO. IRON, Tin Plates, Metals & Chemicals. 104 JOHN ST., N. Y. Representing: JEVONS & CO., Iron Merchants, Liverpool. W. S. & N. CAINE, Tin Plate & Metal Merchants, Liverpool. GOLDING & CO., Limited, Chemicals, Liverpool.	DAVID CARPENTER, Manufacturer of HOT PRESSED NUTS, And Dealer in All kinds of Refined Bar & Horse Shoe Iron, 402 Water Street, New York.	A. G. HATRY, Manufacturers' Agent and Broker. Bar, Sheet, Tank, Boiler, Angle, T, and Railroad Iron, Nails & Spikes, Steel & R. R. Supplies. PITTSBURGH, PA.
ABEEL BROTHERS, Established 1765 by ABEEL & BYVANCK, Iron Merchants, 190 South Street and 365 Water, N. Y. ULSTER IRON A full assortment of all sizes constantly on hand. Refined Iron, Horse-Shoe Iron, Common Iron. Band, Hoop and Scroll Iron. Sheet Iron. Norway Nail Rods. Norway Shapes. Cast, Spring and Tire Steel, etc.	POWERTVILLE ROLLING MILL, JOHN LEONARD, 450 & 451 West Street, NEW YORK. Manufacturer of all sizes of MERCHANT IRON and HOOPS. Also Manufacturer of Best Charcoal Scrap Blooms. And Dealer in Old and New Iron.	BOONTON CUT NAILS, HOT PRESSED NUTS, Machine Forged Bolts, Washers.	J. C. LEFFERTS, Metal Broker, PIG, RAILROAD & SCRAP IRON 241 PEARL STREET, NEW YORK. ESTABLISHED 1840.	SHOENBERGER & CO. Manufacturers of CUT NAILS, AND Spikes, HORSE AND MULE SHOES, Horse Shoe Bar, & SHEET IRON. Goods warranted equal to any in the Market. Send for Circulars in regard to "PICKED NAILS." PITTSBURGH, PA.
A. R. Whitney & Bro., Manufacturers of and Dealers in IRON, 56, 58 & 60 Hudson, 48, 50 & 52 Thomas, and 12, 14 & 16 Worth Sts., Our specialty is in Manufacturing Iron Used in the Construction of Fire-Proof Buildings, Bridges, &c. AGENCY OF Abbott Iron Co. Boiler Plate & Tank Iron. Glasgow Tube Works Boiler Flues. Pencoset Iron Works Shingles. Elastic Rubber Mill & Tires and Tires. A. R. Whitney & Bro.'s Rivets. Whitney's Best Bar Iron. Passenger Cars, Tires, Wrought Iron Beams and Channel Iron. Paxton Rolling Mills. Books containing Cuts of all Iron now made, and Sam- ple Pieces at office. Please address 59 Hudson Street.	AMERICAN Galvanized Sheet Iron, AND AGENT FOR THE Easton Sheet Iron Works, Easton Pa. MANUFACTURER OF Best Bloom, Charcoal & Refined Sheet Iron, Galvanized Telegraph and Fence Wire Galvanized and Tinned Roofing and Slatting Nails. Galvanized Hoop Iron of all widths. Galvanized Staples. Corrugated Iron for Roofing, plain or gal'd. Galvanized Bars and Chains for Cemetery Railing. Tin Plates, Spelter, and other Metals.	Swedish Iron. A Variety of Brands, including  BARS suitable for Steel of all grades, Wire, Shovels, Hoes, Scythes, Carriage Bolts, Nail Heads, Tacks, &c. CHARCOAL PIG IRON for Bessemer and Car Wheels. MUCK BARS for Steel Smelting and Re-rolling. SCRAP OR BAR ENDS . Direct Agency for N. M. Höglund, of Stockholm, represented in the United States by NILS MITANDER, 69 William St., New York. ABBOTT & HOWARD, ALBERT POTTS, Boston, Mass. AGENTS: Philadelphia, Pa.	DANIEL W. RICHARDS & CO., Importers of and Dealers in SCRAP IRON, Pig Iron, OLD METALS. YARDS: 88 to 104 Mangin St., Foot of Stanton St., E. R., 71 to 79 Tompkins St., OFFICES, 90 & 92 Mangin Street, New York, 178 Pearl Street, 30 The Albany, Liverpool, England.	BURDEN'S HORSE SHOES. "Burden Best" Iron. Boiler Rivets. Burden Iron Works, H. Burden & Sons Troy, N. Y.
BORDEN & LOVELL, Commission Merchants 70 & 71 West St., Wm. Borden, L. N. Lovell, Agents for the sale of Fall River Iron Co.'s Nails, Bands, Hoops & Rods, AND Borden Mining Company's Cumberland Coals.	NORWAY IRON WORKS. Spring, Tire, Toe Calk & Sleigh Shoe Steel. BLISTER STEEL, SCRAP RODS, 3-16, 1-4 and 5-16 Round and Square. Norway Shapes & Nail Rods, Etc., Etc. Address, NAYLOR & CO. New York, Boston or Philadelphia.	B. F. JUDSON, Importer of and Dealer in SCOTCH AND AMERICAN Pig Iron, Wrought & Cast Scrap Iron, English and American HORSE SHOE IRON, &c., 457 & 459 Water St., and 233 South St., NEW YORK.	G. D. ROSEBERRY, Pottsville, Pa. Manufacturer of RAILROAD SPIKES MINING SPIKES, Cold Pressed Nuts, Machine Bolts & Bolt Ends	ASA SNYDER, Importer of Scotch, and Furnace Agent for the cele- brated Anthracite and Hot and Cold Blast Charcoal PIC IRONS. OFFICE AND YARD: 1008, 1010, 1012 and 1014 Cary Street, Richmond, Va. Orders for Scrap Iron filled.
WILLIAM H. WALLACE & CO., IRON MERCHANTS Cor. Albany & Washington Sts., NEW YORK CITY. W. H. WALLACE. W. BISHOP.	P. W. GALLAUDET. Banker and Note Broker, Nos. 3 and 5 Wall Street, NEW YORK. HARDWARE, METAL, IRON, RUBBER, SHOE, PAPER AND PAPER-HANGINGS, LUMBER, COAL AND RAILROAD PAPER WANTED. ADVANCES MADE ON BUSINESS PAPER AND OTHER SECURITIES.	REYNOLDS & CO., 145 EAST STREET, NEW HAVEN, CT. Manufacture Iron and Steel Set Screws, Round, Square and Hexagon Head; Machine and Cap Screws; Piano, Knob and Lock Screws; Machine, Bridge and Roof Bolts, Bolt Ends, Blanks, Nut, Washers, etc., of every descrip- tion send for Price List.	Girard Rolling Mill Co., Manufacturers of MERCHANT BAR IRON AND T RAIL, Nuts, Washers, Collar, Machine and Bridge Bolts, Patent Car Coupling Links & Pins. Girard, Ohio.	PACKARD, GOFF & CO. Youngstown, O. Manufacturers of Merchant Bar Iron. Mills at Hubbard, O.; also Jobbers in Nails, Nuts, Washers & Carriage Bolts.
HOLDEN, HOPKINS & STOKES IRON CAST STEEL, RAILS, & R.R. SPIKES. 104-106 JOHN ST., NEW YORK.				

Manufacture of **BRASS WORK** for Water, Gas and
Steam, of all kinds, comprehending
which are more simple and durable than others man-
ufactured, and especially adapted for sandy or muddy
water, steam, air, gas and fluids of all kinds?
Spare parts for all kinds of machinery, and manufacture
an article which has no superior, and for which there
will soon be an unlimited demand. Send for circular, &c.

J. M. EVERHART, Scranton, Pa.

Iron.
PHILADELPHIA.
Iron and Steel T and Street Rails
Of Best American and English Makes.
CHAIRS, SPIKES, FISH BARS, RAILROAD SUPPLIES.
Muck Bars, OLD RAILS, Scrap, BLOOMS.

American and Scotch
PIG IRON, AND METALS.
CHAS. W. MATTHEWS,
133 Walnut St., Phila.
(Late RALSTON & MATTHEWS, 128 Walnut St.)

MALIN BROS., IRON
Commission Merchants,
No. 228 Dock Street,
3d door below Walnut, PHILADELPHIA.

H. L. GREGG & CO.,
Ship Brokers & Commission Merchants,
Importers of
Old Iron, Metals and Rags.
Freight engagements made to all parts of the world.
Marine insurance effected in reliable offices.
108 Walnut St., Phila.

JUSTICE COX, Jr. & CO.,
Iron Commission Merchants.
Foundry and Forge Pig Iron,
New and Old Rails, Muck
Bar, Scrap, &c.
No. 333 Walnut Street, PHILADELPHIA.

THE CAMBRIA IRON WORKS,

Situated on the line of the Pennsylvania Rail Road, at the western base of the Allegheny Mountains, are the largest of their class in the United States, and are now prepared to make

1800 TONS PER WEEK,

Of Iron and Steel Railway Bars.

The Company possesses inexhaustible mines of Coal and Ore, of suitable varieties for the production of Iron and Steel rails of

BEST QUALITY.

Their location, coupled with every known improvement in machinery and process of manufacture enable them to offer rails, when quality is considered, at lowest market rates.

The long experience of the present Managers, of the Company, and the enviable reputation they have established for "CAMBRIA RAILS," are deemed a sufficient guarantee that purchasers can, at all times depend upon receiving rails unsurpassed for strength and wear by any others of American or foreign make. Any of the usual patterns of rail can be supplied on short notice, and new patterns of desirable weight or design will be made to order. Address,

CAMBRIA IRON COMPANY
218 S. Fourth St., PHILADELPHIA,
or at the works, JOHNSTOWN, PA.

The Phoenix Iron Co.,
410 Walnut St., Philadelphia.

MANUFACTURERS OF

CURVED, STRAIGHT AND HIPPED
Wrought Iron Roof Trusses

BEAMS, GIRDERS, AND JOISTS,
and all kinds of Iron Framing used in the construction of Iron Roof Buildings.

Deck Beams, Channel, Angle and T Bars

curved to template, largely used in the construction of Iron Vessels.

Pat. Wrought Iron Columns, Weldless Eye Bars,

for Top and Bottom Chords of Bridges.

Railroad Iron, Street Rails, Rail Joints and Wrought Iron Chairs.

Refined Bar, Shafting, and every variety of Shape Iron made to order.

Plans and Specifications furnished. Address

SAMUEL J. REEVES Vice Pres.

The LACKAWANNA IRON & COAL CO.,
SCRANTON, PA.,
(OFFICE IN NEW YORK CITY, 52 WALL STREET),
MANUFACTURERS OF

BEST QUALITY
RAILROAD IRON.
Forge and Foundry Pig,
BEST DOUBLE-REFINED MERCHANT BAR IRON,
CAR AXLES AND STRAP RAIL.

ORDERS CAN BE FILLED AT ONCE.

The Company's works for manufacturing BESSEMER STEEL RAILS will be completed during the summer of 1875.

Iron.
PHILADELPHIA.
W. GRAHAM HOOPES
Commission Merchant
FOR THE SALE OF
Pig, Bloom, Plate, Bar & Railroad
IRON,
No. 419 Walnut Street, Philadelphia.

Warren Spike Works.
G. W. FAHRION,
Manufacturer of
Railroad, Ship and Boat
SPIKES,
All Shapes and Sizes, Black and Galvanized.
Warren, Ohio.

Spooner & Collins,
COMMISSION AGENTS,
PIG IRON
Blooms, Bar, Sheet & Hoop Iron.
409 N. Third St., (Room No. 6), St. Louis.

Bonnell, Botsford & Co.,
Iron, Nails & Spikes.
YOUNGSTOWN, OHIO.

Warren Boiler Works,
Phillipsburg, N. J.
Steam Boilers,
Tanks,
Heaters,
Stacks, Pipe,

And all Wrought Iron work made to order.

ESTIMATES GIVEN ON CONTRACT WORK FOR FURNACES AND ROLLING MILLS,

A Liberal Discount on Boilers to Engine Builders.

Prices given on application. Address,

TIPPETT & WOOD.

THE TINNERS' FAVORITE.

Oinsted's Patent Late Improved Setting Down Double Seaming and Dapping Machine.

This machine, so long and favorably known to the trade, has lately been materially improved, and now represents as a perfect machine: working in XX, XXI, XXII, and XXXX ton, shears, and an upper, straight, dapping and oval work, such as wash boilers, coffee pots, &c. It is the best machine in use that does seam and sets down without changing the work. Its dies and setting down wheel are made of cast steel. The entire machine and attachments are constructed on a principle that secures its satisfactory operation. It is armed with a safety device.

Price, \$5. See advertisement in *The Metal Worker*.

Send for Circular and Price List to **W. L. Bradley**, Manufacturer, 38 William St., N. Y. City. Also, Olmsted's Double Seaming and Dapping Machine, and Waugh's Circular and Squaring Shears.

THE HOBBS, POPE & CO.

35 India Street, BOSTON.

AGENTS,
NEW YORK,
JOHN S. LAMSON & BRO., PITTSGROVE, PA.

GEO. COLHOUN & SON.

TACKLE BLOCKS.

BURR & CO

Manufacturers of Waterman and Russel's

PATENT IRON STRAPPED BLOCKS.

Also Manufacturers of

ROPE STRAPPED BLOCKS,

31 PECK SLIP, NEW YORK

New Patents.

We take from the records of the Patent Office at Washington the following specifications of certain patents lately issued, which will be found interesting:

IMPROVEMENT IN PUDDLING FURNACES.

Specification forming part of Letters Patent No. 161,317, dated March 23, 1875, issued to Enoch Wood, of Pittsburgh, Pa.

Figure 1 is a vertical section of furnace. Fig. 2 is a plan view. Fig. 3 is a perspective view of the balling tool.

This invention relates to that class of puddling and balling furnaces wherein the metal bed or basin is made to revolve, and, by the use of a stationary balling tool the metal, when properly worked up, is balled all at once by one single operation; and my invention consists, first, in the novel construction of the balling tool; and, secondly, in the means for excluding air from the rotary basin, all as hereinafter specifically described and claimed.

For these purposes construct a puddling and balling furnace as follows: Change the shape of the usual reverberatory furnace by narrowing its bore at or about the circular metal basin, forming a shoulder or offset in the furnace, whose projection culminates at about the center of the metal basin. This, by directing the heat into the basin and upon the metal, hastens and facilitates the operation of puddling. To

keep rolling and tumbling about until firmly balled, when they are ready for the squeezers or rolls.

Reference being had to the accompanying drawings, A represents a reverberatory furnace containing the rotating basin B. At C are shown the shoulders or offsets in the side walls of the furnace, b designates the lip or flange on the basin B. D is the cylindrical vertical flange, extending down into the foundation plate E, and having near its bottom downwardly curved annular flanges e e, overlapping the vertical flanges c c lining the trough c in the foundation plate. The central vertical shaft F is attached to the metal basin B, and rests in a socket in the foundation, being also supported by a ring, f, braced by rods, f, which are constructed with a shoulder to permit them to enter only a proper distance into the foundation plate E. H is the rod or handle of the balling tool, furnished with furled pintles l, upon which hinge the wings h in pairs. This tool passes through the slide in the door, and is removed in the same manner.

Claim.—1. The balling tool consisting of the handle H, with the diverging wings h pivoted or hinged theron.

2. The combination, with the cylinder D and the furnace wall surrounding the same, of the intervening annular sand joint.

3. The cylinder D, in combination with the rotary basin B and the water trough c, said

While the company were engaged in rolling out the 30 foot rail, a new train of rails arrived from Birmingham, Conn., and were put on the lathe in the machine shop, and turned under the direction of Mr. Gustin, who is considered one of the best draughtsmen and roll turners in the country. After the new train was complete the company received an order from the Boston, Revere Beach & Lynn Railroad, a new narrow gauge road, now nearly completed, for a light rail 24 feet in length.

The flats that are rerolled on the night turn are run out on an iron buggy. In the morning they are taken into the mill and piled on an iron buggy; six rail piles are on each buggy, the average weight of which is 4650 pounds. After leaving the scales they are taken to the furnace and charged, the heater placing the iron in position to suit himself. The iron remains in the furnace for about an hour and a half when it is brought to a white heat and ready to be rolled. The iron while in the furnace needs extra care as sometimes the iron is burned, and turns out to be a poor rail and sent back to the shears to be cut up and rerolled again. When everything is in readiness the heater who comes on first blows the whistle, indicating that he is ready, the roller gives the gong rope a pull and the huge engine is set in motion. The buggyman places his buggy before the furnace, and the heater's helper with a large pair of tongs and with four men to help him, two on each side, draw the fiery iron on the buggy.

The iron is run to the first train of rolls, called the roughing rolls. Through these rolls it passes eight times, and as it comes out of the last pass on the front side it runs over to the finishing rolls. As it passes through these rolls the rail gradually lengthens, and as it comes out of the last pass on the front side, the rail is then over 50 feet long. The rail is carried then by friction rolls to the sweep when a boy sets the rail; both ends are here sawed off, and the rail is sawed once more in the center, thereby making two 24 foot rails out of a 48 foot rail.

The rail is drawn through the friction rolls to what is called the sweep, and from there on to the hot bed. The sweep can be arranged so that the rail can be turned into a semi-circle if so desired. It is worked by four set screws. After the rail lays on the hot bed for some time, it is carried to the rail straightener, on rolls, and from there to the clippers and filers. It is then taken to the puncher, and from there they are loaded on the cars and sent to their destination.

The weight of this new rail is 322 pounds, 40 pounds to the yard; two pounds are allowed for "wear and tear" through the rail-straightener, clipper and filer and punch. The weight of the entire rail when 48 feet in length is 640 pounds.

This new train of rolls was made expressly to roll light iron from 40 to 56 pounds to the yard. When the company are working on the heavier rail 30 feet in length, these rolls are changed and another train set in their place.

The rolling of an iron rail 48 feet long has never before been attempted in any rail mill in the country; and this rail, thus far, has proved a complete success.

Charcoal Iron for the English Market.

Mr. R. P. Sibley, president of the Round Mountain Coal and Iron Co., has written the following interesting letter to Mr. Swank:

OFFICE OF THE ROUND MOUNTAIN COAL & IRON CO., OF ALABAMA, ROME, GEORGIA, May 3, 1875.

To the Secretary of the American Iron and Steel Association.—DEAR SIR: Your letter of April 30th is at hand, and in reply I would state that our company made its first shipment of pig iron to England last November, which was promptly sold to different parties at £7 per ton. So far, agricultural works have been the principal purchasers, but, should England get to making cast car-wheels, we expect to build up a large trade in that line, as our iron is extensively used here by Messrs. Noble Brothers & Co. for that purpose. It is also well adapted for heavy machinery, chilled rolls, etc., owing to its great strength. I am informed that it was pronounced by the United States Board of Ordnance, in 1859-60, to be the strongest iron in the United States, and it is considered by several army officers to be very fine for ordnance purposes. Gunes that were made from it stood a quadruple charge without bursting.

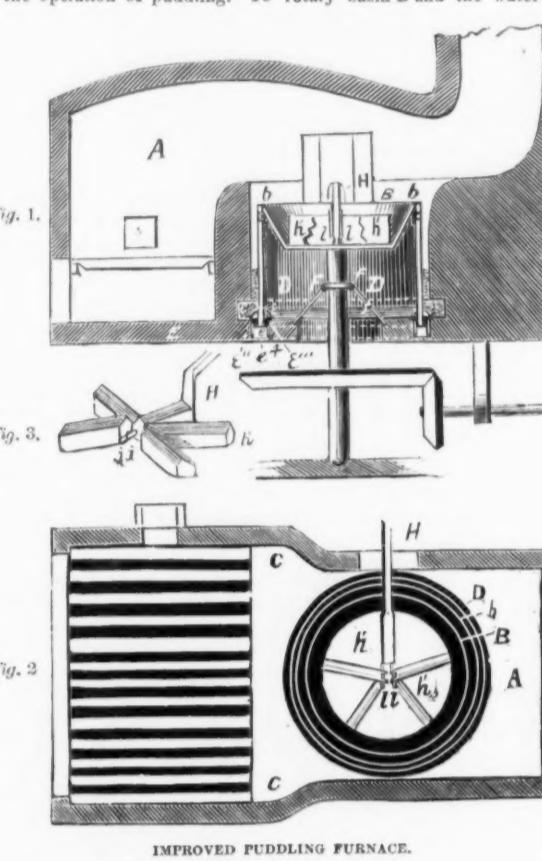
We have made several shipments to England, none of which have brought under £7 sterling per ton, and now have iron ready for further shipments. We find that at present prices our iron nets us as much in England as it would in Cincinnati. When our iron is fully tested in England, and the iron trade requires, we expect to realize a considerably higher price. We have received several statements praising it, not only on account of its strength, but for its valuable chilling properties. It is made from fossiliferous ore, which yields about 60 per cent. of iron. American charcoal pig iron should not be sent to England unless it is strong and will chill well, as it would come into competition with Swedish and Russian iron.

I know of no English capital invested in any furnace either in Alabama or in this State, but have heard that some Englishmen are interested in Southern ore lands. The Round Mountain Coal and Iron Company, of Alabama, which made the pig iron that was shipped to England, is composed entirely of Georgia capitalists. It was organized just previous to the panic, and could, with the expenditure of a few thousand dollars, increase its yield some 3000 or 4000 tons per annum. The Ridge Valley Iron Company, of Georgia, and the Cornwall Iron Company, of Alabama, have made sample shipments of their pig iron to England; the latter company says it intends to ship 100 tons soon. Yours, truly,

ROBERT P. SIBLEY, President.

The Pottsville Miners' Journal of the 14th inst. says: Tuesday morning Pioneer Furnace No. 2, which has not been working well for some days, finally chilled in spite of all efforts to prevent. Work was at once begun to prepare it for working order. The loss in a case of this kind is always considerable.

During the past year over \$100,000 worth of nickel has been shipped to Wales from Mine La Motte, Mo.



In the lipped or flanged edge of the circular metal basin attach a deep cylindrical flange, extending from the lip on the basin down to the foundation plate, and into an annular groove in the same, which is kept filled with sand or water by hoppers or pipes adapted for the purpose. This cylindrical flange, which is vertical, is provided near the bottom with downwardly curved annular flanges inside and outside, and, respectively, overlapping vertical flanges rising from the two sides of the annular groove in the foundation plate. The purpose of these flanges is to exclude slag, cinders, or any foreign substance from entering the groove, and thereby clogging the same. The cylindrical flange being fastened air tight at its top to the lip of the metal basin, and revolving with it, and the sand in the groove preventing access of air, the metal in process of puddling is absolutely secure against danger arising from the admission of atmospheric air or vapors, which might injure the quality of the metal, while the air has free ingress to the exterior surface of the metal basin for cooling purposes. The cylindrical flange serves, as also a partial support for the metal basin. The latter is otherwise supported on a central vertical shaft, held in place by a ring supported by rods passing laterally and downwardly into the foundation plate. This shaft rests in a step or socket below the foundation plate, and is fixed to, and revolves with, a beveled wheel which meshes with a pinion-wheel fixed to a horizontal shaft, the whole so arranged that, by turning the latter, the vertical shaft rotates the furnace bed or metal basin.

In the ordinary sliding door construct another slide for the admission of the balling-tool. The metal is puddled by the stationary flat-shaped rabbet, and, when ready for balling, this is withdrawn, and the balling-tool inserted through the slide. This tool consists of a rod bent at right angles twice, thus continuing in parallel lines. The interior end of the rod is enlarged into a heavy plate or wing, so constructed that when lowered into the basin it will extend from the circumference to the center of the same. To the end of this are attached one, two, or more plates, upon which similar wings in pairs, rigidly fixed, are loosely hung in such a manner relatively that, when spread out in the basin, they form radii, and divide the basin into three, five, or more equal segments, and are also so hung that when the tool is lifted from the basin the wings or enlargements fall together in a compact form, easily removable through the door slide. When the metal is puddled this tool is inserted and lowered into the mass of molten metal, cuts it into three, five, or more equal portions, each of which then, by the rotation of the basin, is

kept rolling and tumbling about until firmly balled, when they are ready for the squeezers or rolls.

Claim.—The compound for welding steel herein described, consisting of dress, saltpeter, and lime, as set forth.

Rolling Forty-Eight Feet Rails.

The St. Albans Daily Messenger says of the new rails now rolled at the large mill in that place:

Last October, just before the rolling mill shut down for the winter, Superintendent Gustin tried an experiment of his own in rolling out an iron rail 48 feet in length. During the winter, while the mill was idle, he devoted his spare moments in perfecting and arranging his plans, so that when the mill would start up again everything would be in readiness to commence work on the new rail. In the month of March the rail mill commenced work, rolling out rails 30 feet in length for the Central Vermont, and afterward for the Cheshire road.

IRON.
CLEVELAND.
CLEVELAND ROLLING MILL CO.,
Manufacturers of
BESSEMER STEEL RAILS,
Steel Plates and Forgings, Railroad Iron, Merchant Bar,
Beams, Girders, Spikes, Bolts, Spikes, &c., &c.
Office, Nos. 99 and 101 Water St., **CLEVELAND, O.**
A. B. STONE, Pres. H. CHISHOLM, V. P. & Gen. Supt.
E. S. PAGE, Secy.

Cleveland, Brown & Co.
IMPORTERS, MANUFACTURERS AND DEALERS IN

IRON AND STEEL,
HORSE SHOES, HORSE NAILS,
NORWAY NAIL RODS,
NAILS, SPIKES,
'Standard Taper' Axles & Swedes Iron,
WINDOW GLASS,
Wrought Iron Pipe and Boiler Tubes,
Bolts, Rivets, Nuts, Washers, and Heavy
Hardware Generally.
25, 27, 29 & 31 Morwin Street,
CLEVELAND, OHIO.

OLD DOMINION

Iron and Nail Works Company,
RICHMOND, VA.,
R. E. BLANKENSHIP Commercial Agent,
Manufacturer

NAILS AND BAR IRON,
Bands, Scrolls, Horse Shoe Bars, Nut and
Rivet Iron, Spike Rods, Shunting, Bridge
Bolts, Oval, Half Oval, Half Round, &c.

The Iron-Masters' Laboratory.

Exclusively for the Analysis of Ores of Iron,
Pig and Manufactured Iron, Steels, Limestone,
Clays, Slags & Coal for Practical Metal-
lurgical Purposes.
No. 339 Walnut Street, Philadelphia.
J. BLODGET BRITTON.

This Laboratory was established in 1866, at the instance
of a number of practical iron-masters, expressly to afford
prompt and reliable information upon the chemical composition
of the substances above mentioned, for melting and refining purposes. The object being to make it at
once a convenient, practically useful, and comparatively
inexpensive adjunct to the Furnace, Forge and Rolling
Mill.

CHARGES TO IRON WORKS.
For determining the per cent. of Pure Iron in an
ordinary Ore..... \$1.00
For the per cent. of Pure Iron, Sulphur and Phos-
phorus in do..... 12.50
For each additional constituent of usual occur-
rence..... 1.50
For those of unusual occurrence or difficult to de-
termine, the charge must necessarily depend upon circumstances.
For determining the per cent. of Sulphur and Phos-
phorus in Iron or Steel..... 14.00
For each additional constituent of usual occur-
rence..... 6.00
For the per cent. of Carbonate of Lime, and in-
soluble Silicious Matter in a Limestone..... 10.00
For each additional constituent..... 2.00
For the per cent. of Water, Volatile Combustible Matter, fixed Carbon, and Ash in Coal..... 12.50
or determining the constituents of a Clay, Slag,
Coke, or of any other material that will correspond
therewith for the constituents of an ore, etc.
For a written opinion or letter of instruction the charge
most necessarily depend upon circumstances.
Printed instructions for obtaining proper average samples
for analysis furnished upon application.

SCHOOL OF MINES,
COLUMBIA COLLEGE,
East 49th Street, NEW YORK.

FACULTY:
T. A. P. BARNARD, S. J., LL. D., President.
T. EGGLESTON, JR., M. A., Mineralogy and Metallurgy.
FRANCIS L. VINTON, E. M., Mining Engineer.
E. F. CHANDLER, Ph. D., Analytical and Applied
Chemistry.
J. TORREY, M. D., LL. D., Botany.
CHARLES A. JOY, Ph. D., General Chemistry.
WILLIAM G. PECK, LL. D., Mechanics and Mining
Surveying.
J. VAS AMBRINE, A. M., Mathematics.
W. DENNIS, N. GOOD, A. M., Physics.
JOHN S. NEWBERY, M. D., Geology and Paleontology.
The plan of this school embraces a three years' course
for the degree of ENGINEER OF MINES, or BACHELOR OF PHILOSOPHY.
For an admission, candidates for a degree must pass an
examination in Algebra, Geometry and
Plain Trigonometry. Persons not candidates for degrees
are admitted without examination, and may pursue any
or all of the subjects taught. The next session begins
October 1st. The annual subscription for admission will
be held on June 20th and September 20th, 1871. For
further information and catalogues, apply to
DR. C. F. CHANDLER,
Dean of the Faculty.

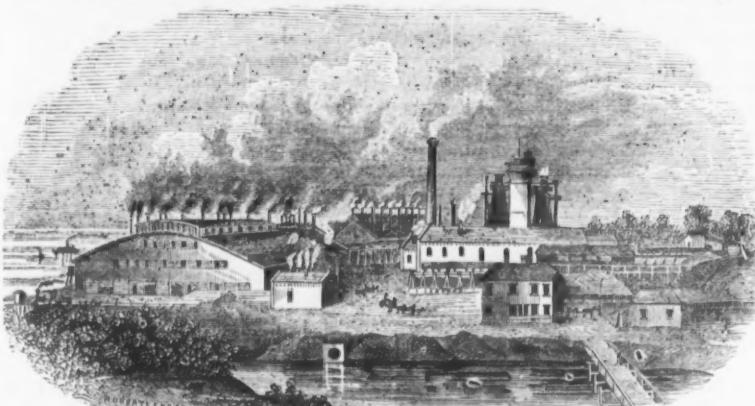
MAYNARD & VAN RENSSALAER,
CONSULTING
Mining and Metallurgical
ENGINEERS,
Experts in Iron and Analytical Chemistry.
26 1-2 Broadway, NEW YORK,
George W. Maynard, Schuyler Van Rensselaer.

THOMAS M. DROWN,
Analytical Chemist.
LAFAYETTE COLLEGE,
EASTON, PA.

STEAM PUMPS
Manufactured
by
CRANE BROS.,
MFG. CO.,
Chicago.

IRON.

MILWAUKEE IRON CO.,



RAILROAD IRON

From 30 to 65 Lbs. per Yard.

Re-Rolling done on short notice.

PIG IRON.

BEST NO. 1 FOUNDRY IRON constantly on hand and for sale in car-load or larger lots, at lowest market price.

Merchant Bar Iron.

A FULL ASSORTMENT—SUPERIOR QUALITY.

Address all correspondence to

MILWAUKEE IRON CO.,
MILWAUKEE, WIS.

P. J. POTTER. JOHN W. HOFFMAN. WILLIAM TOOKE. SOUTHERN HOFFMAN.
Potter, Hoffman & Co.,
110 Liberty St., N. Y.

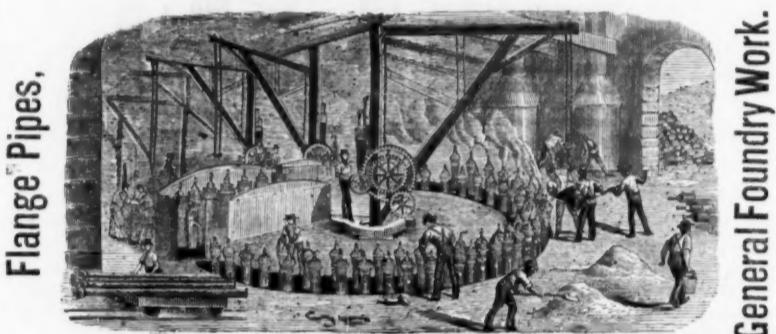
GENERAL RAILROAD SUPPLIES.

AGENTS FOR

Bay State Iron Co., Boston Mass.
Homogeneous Plates, Rails, &c.
Crucible Steel Tires, Axles, Forgings,
&c.

Chrome Tool Steel and Spring Steel.
Nichols, Pickering & Co.'s Springs.
Sax, Kear & Co.'s Patent Steel Tired
Wheels.

JOHN MCNEAL & SONS,
BURLINGTON, N. J.



CAST IRON PIPES
FOR WATER AND GAS.

John H. Reed & Co.,
IRON MERCHANTS.

And Agents for

BAY STATE IRON CO.

Manufacturers of

Homogeneous
Boiler and Fire
Box Plates.



Plate, Sheet, Pig
and Railroad
Iron.

Wrought Iron Girder, Channel & Deck Beams.
ANGLE & T IRON, BOILER & TANK RIVETS,
Lap-welded Iron Boiler Tubes,
Wrought Iron Steam & Gas Pipe.

OFFICES,

2 Pemberton Sq., Boston, Mass.

EDGAR'S PAT. "GEM" STOVE SHOVEL.

Strong, Durable, Cheap. Sells at Sight.

For Sale by all Jobbing Houses.



EAST RIVER
SHEET METAL MFG. CO.,
Sole Manufacturers,
253 Pearl Street, N. Y.

IRON.



ATKINS BROTHERS,

PROPRIETORS OF THE

Pottsville Rolling Mills & Pioneer Furnaces
POTTSVILLE, PENNSYLVANIA.

Having introduced New and Improved Machinery into their Rolling Mills, and manufacturing all their Iron from the ore, and also doing all Machine Work and Repairs in their own shops, they are enabled to produce

RAILROAD IRON

Of uniform quality, unsurpassed for strength and wear, and of any required length.
Address the Proprietors Pottsville, Pa.

The Britannia Ironworks Company, Limited,
Middlesbrough, England,

MANUFACTURERS OF

ALL DESCRIPTIONS OF IRON RAILS

Surplus Stocks of Various Sections always on hand.

London Office: W. G. FOSSICK, 6 Laurence Pountney Hill, E. C.
Weekly Output, One Thousand Tons.

HEATON & DENCKLA,
HARDWARE COMMISSION MERCHANTS,
PHILADELPHIA.

Branch Office, 97 Chambers and 81 Reade Streets, N. Y.

AGENCIES:
Mallory, Wheeler & Co.,
American Screw Co.,
Dowd & Axe Mfg. Co.,
Stuart, Peterson & Co.'s Castings,
Morion & Bremmer's Balances,
Foster's Horse Nails,
Anchor Brand Nails,
Western File Works,
Philadelphia Casting Bolts,
Royer's Ford Sad Irons,
Givard Mfg. Co.'s Locks,
Plymouth Mill Rivets.

Union Mig. Co.'s Drilled
Bolts, Western File Works,
Philadelphia Casting Bolts,
Aiken's Saw Sets,
Cast Steel, Octagon, Flint and
Square, &c., &c.

BAEDER, ADAMSON & CO.,
Manufacturers of
Sand and Emery Paper and Emery Cloth

(Also, in rolls for machine work.)

GROUND EMERY, CORUNDUM AND FLINT,
Glue & Curled Hair, Cow Hide Whips.

STORES:

PHILADELPHIA, 730 Market St.,
NEW YORK 61 Beckman St.,
CHICAGO, 182 Lake St.

BOSTON, 143 Milk St.,
CINCINNATI, 92 Main St.,

BIRMINGHAM SCREW CO., Limited.
ALFRED FIELD, President.

The Screws of this company are imported only in small, limited quantities.

ALFRED FIELD & CO.,
Sole Importers,
93 Chambers and 75 Reade Streets, N. Y.

Middletown Tool Co.,
MIDDLETOWN, CONN.

Manufacturers of
The Celebrated "Baldwin" Plane Iron.
HENSHAW'S SNAPS
Greatly Improved in Style and Pattern.

HART, BLIVEN & MEAD MFG. CO., Agents
18 & 20 Cliff Street, N. Y.

To all Manufacturers who use Emery for polishing Iron and Steel Goods, and for the manufacture of Polishing and Cutting Wheels, and other purposes.

CORUNDUM

FROM THE
UNIONVILLE MINE, Chester County, Pa.,
Manufactured by the
PENNSYLVANIA CORUNDUM COMPANY.

Are now prepared to furnish a very superior quality of Genuine Corundum, from the Unionville Mine, Chester County, Pa., which is the largest known deposit of Corundum in the world. It is harder than Emery or any other known mineral except the "Diamond," and superior in its cutting qualities for the polishing or cutting of steel, iron or other hard substances for which Emery has been used.

JAMES C. HAND & CO.,
COMMISSION MERCHANTS,
No. 614 & 616 Market Street.

ESTABLISHED A. D. 1833 and 1855.

JACOBUS & NIMICK MFG. CO.,
PROPRIETORS OF

Pittsburgh Novelty Works & Pittsburgh Variety Works.

Manufacturers of

LOCKS AND LATCHES.

Fairbanks' Standard Platform and Counter Scales, Paint and Coffee Mills Builders' and Domestic Hardware generally.

New York Office, 96 Chambers St., N. Y.

UPPMAN & EMORY, Baltimore, Md., Southern Agents.

W. & B. DOUGLAS,
MIDDLETOWN, CONN.

The Oldest and Most Extensive Manufacturers of

PUMPS, HYDRAULIC RAMS, GARDEN ENGINES

AND OTHER

Hydraulic Machines

IN THE
WORLD.

Awarded the GRAND MEDAL of PROGRESS at WORLDS' EXPOSITION, VIENNA, 1873, being the highest awards on Pumps, &c., also, highest medal at PARIS in 1867.

Descriptive Catalogues and Price Lists sent when requested.

BRANCH WAREHOUSES,

85 & 87 John Street, N. Y.

AND

197 Lake St., CHICAGO, III.



UNION MANUFACTURING COMPANY,

Manufacturers of all styles Plain and Ornamental Butts,

LOOSE PIN REVERSIBLE,

Cast Fast & Loose,

Drilled and Wire Jointed.

Japanized, Figured Enamelled, Nickel Plated, and Real Bronze Butts. A. no. 8 full line of

IRON & BRASS PUMPS,

Cistern, Well, and Force Pumps, Yard, Drive Gated, Engine and Steam Boiler Pumps, Hydraulic Rams, &c., and all kinds of modern improvements.

187 Fine Castings a Specialty.

NEW BRITAIN, CONN.

Warehouses, 199 Chambers Street, N. Y.

4 India Street, Boston, (Butts.)

107 Kilby Street, Boston, (Pumps.)

Send for New Illustrated Catalogue and Price List.



WRIGHT'S
Double Acting,
BUCKET - PLUNGER
STEAM PUMPS.

ALWAYS RELIABLE
VALLEY MACHINE CO., Easthampton, Mass.

KANAWHA
PUMP WORKS

Burlingham & Purdy,

PROPRIETORS.

Depos :

88 Camden Street,
Baltimore, Md.

103 Chambers Street,
New York.

Factory, Charleston,
West Virginia.

Manufacture the Genuine

CUCUMBER
WOOD PUMPS.

Price List with description sent
on application.

See wholesale price current in
this paper



These goods are strictly first-class. They are made from selected Cucumber Timber, and carefully and substantially constructed, and when put into use are warranted to work satisfactorily in all respects.

WILLIAM A. RICH, Manufacturer,
Warehouse and Salesroom,

107 Beade Street, N. Y.

OSBORN MFG. CO.

TRADE MARK

BLEECKER ST. NEW YORK.

OSBORN'S METAL CAGES.



HEINZ, PIERCE & MUNSCHAUER,
BUFFALO, N. Y.

Manufacturers of
Palace Refrigerators
AND
ICE CHESTS.

Hard Wood Palace Refrigerators..... 3 sizes.
Oak Grained " " 5 "
Oak Grained Double Door Ice Chests..... 4 "
Granite Painted " " 4 "

Filters and Coolers combined.

Send for Illustrated Catalogue.

The Original Inventors and Manufacturers of the

OSBORN BRIGHT METAL CAGES.

Also OSBORN & DRAYTON Improvements under
twelve different patents. We are continually bringing
out new and beautiful designs to meet the demands of
reputation and taste.

ALVAN DRAYTON, General Agent.

The Early History of the Lehigh Coal and Navigation Company.

The Infancy of the Anthracite Coal Trade—The First American Railway—The Use of Anthracite Coal in Making Iron.

[Concluded.]

In 1833 the Lehigh Company completed the Room Run Railroad, about five miles long, on the northem side of the mountain, from the Room Run Mines to Mauch Chunk; and soon after that the Beaver Meadow and Hazleton Railroads were made by other companies, from their respective mines, to connect with the Lehigh Navigation.

As the defects of the Delaware Division Canal were the cause of much loss and great delay to the Lehigh Company, and as that canal was made by the State of Pennsylvania, I wish to say something about the management of public works by the State: After leaving the Lehigh, I was for more than six years in the service of the State, on the public works in Western Pennsylvania, and had good opportunities of seeing how business was conducted. In this connection I wish to say that I have a high respect for the memory of the late James Clarke, long the president of the Board of Canal Commissioners. He was first a member of the legislature in 1823, when my father, Chas. Roberts, and our highly respected fellow citizen, Henry J. Williams, Esq., were members from this city; and Joseph Ritner, afterward Governor, represented Washington county. Mr. Clarke was one of the authors of the report proposing to carry the canal across the Allegheny Mountains, by means of a tunnel which was to be made like a well laid on its side." In after years he used to laugh about this.

In the year 1835 the Lehigh Company commenced the construction of the ascending navigation from Mauch Chunk to White Haven, a distance of twenty-six miles, the fall to be overcome by lockage, being 600 feet, or about twenty-three feet per mile. To overcome this they built twenty dams and twenty-nine locks. One lock had a lift of thirty feet and one dam was fifty-eight feet high.

In 1837 the Lehigh and Susquehanna Railroad was put under contract, from White Haven to Wilkesbarre, a distance of twenty miles, and crossing the Wilkesbarre mountain at Solomon's Gap. The chief engineer was Edwin A. Douglass. On this line there is a tunnel 1743 feet long, and three inclined planes, ascending from the Wyoming Valley to the top of the mountain, which overcome an elevation of about one thousand feet, and are worked by stationary engines. This road continues to be used for the transportation of coal from the Wyoming coal field, and a very heavy tonnage has been carried over it.

In the month of January, 1841, occurred the memorable flood which devastated the valley of the Lehigh. The writer of this has good reason to remember it. The high dams and locks had been built about three years. It was a terrible ice freshet; heavy rains and melted snow raised the river to a height before unknown; and as the flood tore down the dam abutments and many of the high locks, the pent-up waters of the deep pools rushed down to swell the torrent which swept the valley below. This was a heavy blow to the Lehigh company.

The rebuilding of those portions of the work which had been destroyed was immediately undertaken. It was an unpropitious time: the bank of the United States was tottering to its fall, and the credit of many other corporations was seriously impaired. Money had to be raised in large amounts to repair the broken works upon the Lehigh; and Josiah White, who had lost heavily by the disaster, mortgaged his real estate to raise money to loan to the Lehigh Company. In less than two years the works were reconstructed and made stronger than before. I think that I have never seen a finer example of courage and determination in circumstances of disaster, than that shown by Josiah White on this occasion; and Edwin A. Douglass, the engineer, deserved great credit for his energy in repairing the works.

Although the coal tonnage of the canal was less than 150,000 tons in 1841, it had increased to 781,000 tons in 1849, before the death of Josiah White, who died on the 14th of November, 1850, in the seventieth year of his age.

In the years 1825 and 1826, Bernhard, Duke of Saxe Weimar, traveled in the United States and visited the anthracite coal region; and after his return to Europe he published an account of his travels, which was translated into English, and from which I wish to make a brief extract, as illustrating the changes since that time.

On the 18th of October, 1825, not quite fifty years ago, he traveled in the stage from Philadelphia to Bethlehem, and he says that "Bethlehem is 52 miles from Philadelphia, and, as the intercourse between both places is not very great, the stage goes but twice a week from each place." Where the stage then went but twice a week, there are now seven railroad trains per day.

On the 5th of June, 1826, he visited Mauch Chunk, after passing through Pottsville. In speaking of Pottsville, he says: "This place is scarcely to be found in any map, as it arose but three or four years ago, and owes its existence to the neighboring coal mines." Of the Schuylkill coal mines, he says: "The shafts are not much above twenty feet deep; the coals are brought up in buckets, by means of two windlasses; at one place machinery worked by a horse is employed for this purpose. One shaft contains water, which, as the pumps are not yet in order, must be drawn out in buckets, in a very tedious and expensive manner."

In this same neighborhood, the Philadelphia and Reading Coal and Iron Company has recently sunk a shaft 1128 feet deep, from which

a bore hole has been sunk with a diamond drill into the mammoth vein, at the depth of 1951 feet from the surface of the ground.

Before they commenced their operations upon the Lehigh, the attention of Josiah White and Erskine Hazard had been turned to the question of the use of anthracite coal in the making of iron, and they never lost sight of the matter. It was known that there was a great deal of iron ore in the valley of the Lehigh, and that anthracite coal would make a very hot fire, but how to smelt iron ore successfully with this hard and refractory fuel was not known. At that time charcoal was used in small blast furnaces to make pig iron, and the custom was to use rich ores, and to blow cold air into the furnaces, with a moderate blast produced by machinery worked by water-power. In Great Britain, as charcoal had become very scarce, the coke of bituminous coal was commonly used. The efforts made by many persons in the United States to establish a paying business in the manufacture of pig iron with mineral coal resulted in great pecuniary loss.

Early in the year 1836, the writer of this paper left Philadelphia and went to Great Britain to act as inspector of railroad iron, and to supervise the manufacture of rails which had been contracted for by the Philadelphia and Reading and other railroad companies, in the vicinity of Philadephia.

On arriving in Wales I took up my residence at Cardiff, in Glamorganshire, and made that place my headquarters in 1836 and part of 1837. Cardiff is a port on the northern side of the Bristol channel, and extending from east to west for a distance of about twenty-five miles. The valleys of the river Taff and other small streams which flow from the mountains to the sea, have afforded facilities for the construction of canals, tramways and railways to bring down the coal and iron. In the eastern portion of the region the coal is highly bituminous, and in passing westward it gradually changes its character, becomes harder and contains less bitumen, and, ultimately, in a small portion of the western portion of the region, hard anthracite coal is found, very similar to that of the Lehigh mines.

Before I went to Cardiff, the process of Neilson, of Glasgow, for producing a blast of hot air, and applying it to the smelting of iron by bituminous coal or coke, had been introduced at some of the furnaces in Wales. Neilson had taken out his patent in 1828. It was found to produce considerable economy in the manufacture of iron, and that with some kinds of bituminous coal it obviated the necessity of coking it. The price of iron fluctuated very much, and was sometimes very low; and the iron masters being anxious to diminish the cost of production, tried numerous experiments for that purpose. Many of the men, women and children employed at the mines and iron works were very poorly paid, a large part of the workers receiving, as I was told, but one shilling sterling, or about 24 cents per day.

The successful opening of the Liverpool and Manchester Railway in the autumn of 1829 led to the starting of numerous other railroad projects, and had given a great stimulus to the manufacture of iron. Improvements of various kinds continued to be made. When I first went to Wales the ends of the rails were cut off by hand by blacksmiths, after having been heated in a fire specially made for that purpose; and soon after different mechanical contrivances were used for cutting them off—and at length the circular saws were introduced, and the plan adopted, which is still in use, of cutting off the fag ends of the rails as they come hot from the rolls; by two circular saws revolving at a high speed, at the proper distance apart, to cut off both ends at the same time, and to make the rails of the desired length and with smooth ends, at one operation.

When I was sojourning in South Wales in the early part of the year 1837, the smelting of iron ore with anthracite coal was successfully accomplished by Mr. George Crane, at his iron works at Ynyscedwin, about 13 miles from Swansea. This result was brought about by the use of the hot blast, and, from that time, and from Mr. Crane's success, date the permanent establishment of the anthracite iron manufacture, which has since grown to such great proportions, especially in the Lehigh Valley. From the 7th day of February, 1837, no other fuel than anthracite was used by Mr. Crane in one of his blast furnaces; and, hearing of his success, I visited his works in the month of May of that year, and saw for myself that his success was complete.

I promptly communicated this important information to my uncle, Josiah White, in Philadelphia, and the subsequent establishment of the Lehigh Crane Iron Works, at Catasauqua, about three miles above Allentown, made 54,000 tons of pig iron in 1832. The production at that time, in the Lehigh Valley, from 40 furnace stacks making anthracite iron, being about 325,000 tons per annum, then worth about \$13,000,000, and consuming, in round numbers, about 650,000 tons of coal and 80,000 tons of iron ore.

The tonnage of coal carried on the Lehigh Navigation from its opening until the close of the year 1872, amounted to nearly 27,000,000 of tons—an amount so great that it is difficult to form an adequate idea of it; and, since 1855, the Lehigh Valley Railroad has done a large business, its tonnage since 1862 exceeding that of the canal; and from 1868 the coal tonnage of the Lehigh and Susquehanna Railroad, extending to Easton, has also been large. Both of these railroads run parallel with the canal in the valley of the Lehigh.

Twenty-one years after the great flood of 1841 came the great flood of 1862, and the canals, locks and dams, of the Lehigh Navigation were greatly damaged. It was then wisely resolved by the company not to rebuild the high dams and locks of the upper section of the navigation, but to substitute a railroad, which was soon completed and brought into use.

It has been the good fortune of the Lehigh Navigation Company to be well served by men of high character, from John Cox, its first president, to the present day. The company has passed through many vicissitudes, but when misfortunes have befallen it, it has always risen superior to misfortune, and has maintained its integrity and re-established its credit; and its ability to do so has largely depended upon the confidence which the citizens of Philadelphia have reposed in the character of its managers. The company has not only succeeded, but it has also deserved success.

Crane has been engaged in the iron trade of South Wales, he has had his attention anxiously directed to the application of anthracite coal to smelting purposes, and had at different periods, at a large outlay, tried a variety of plans, but without success, until the idea occurred to him that a hot or heated blast, upon the principle of Mr. Neilson's patent, might, by its greater power, enable him to complete the combustion of this very peculiar coal. By this means he has completely succeeded in the application of anthracite coal to the smelting of ironstone and ore," etc. He then goes on to describe the particulars of the process.

The date of Mr. Crane's patent in great Britain was the 28th of September, 1830; and not long after he had made of his process a commercial success, his claims were disputed, his patent was infringed, and he was involved in litigation with parties supposed to be stronger than himself. After protracted and costly litigation, Mr. Crane's patent was sustained, and the opinion of the court was delivered at Westminster Hall, on the 13th of June, 1842, by Lord Chief Justice Tindall. The Judge says: "There was abundant evidence in the cause, that it had been the great object and desideratum before the granting of the patent, to smelt ironstone by the means of anthracite coal, and that it had never been done before. There is no evidence on the part of the defendant to meet that which the plaintiff brought forward." He also says: "No evidence was produced, on the part of the defendant, to show any inventor earlier than the plaintiff; nor does the fact that there was an earlier inventor appear from the cross-examination of the plaintiff's witnesses." The opinion of the court is printed at length in the Journal of the Franklin Institute for August, 1842.

Whether this opinion of Lord Chief Justice Tindall was right or wrong, the fact remains that no person successfully disputed the claims of Mr. Crane in England and Wales; and that his patent thus sustained became a source of large profit to him; but he did not live long to enjoy it, for he died at his residence, after a short illness, on the 10th of January, 1846, in the 62d year of his age. An obituary notice of him, written by me, is printed in the Journal of the Franklin Institute for March, 1846.

As the claims of George Crane to be the first person to successfully introduce the smelting of iron ore with anthracite coal have been sometimes denied, both in Great Britain and in America, I have thought fit to make these specific references to original documents in printed books, so that persons who may be disposed to do so, may know where to find these authorities.

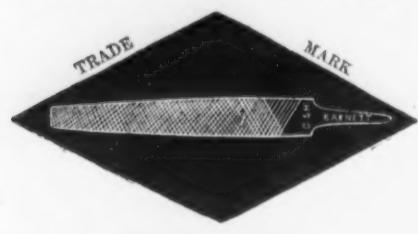
In November, 1837, I returned home to Philadelphia from my sojourn in South Wales, and brought with me very particular and detailed information in reference to Mr. Crane's successful operations. A box of specimens of minerals illustrating the process of manufacturing iron as practiced at Ynyscedwin, was presented by me to the Franklin Institute.

My uncle, Josiah White, in the kindest manner, offered to set me up in the business on the banks of the Lehigh Canal, and in declining this liberal offer, which I did with a grateful sense of my great obligations to him, I was actuated, not by any doubt of the success of the application of the hot blast to the smelting of iron ore with anthracite coal, but by a conviction that my own happiness would not be promoted by my undertaking such an enterprise. I offered to give all the information in my power, and recommended that an arrangement should be made with Mr. Crane, by which one of the men employed by him should be induced to come to America to start the works. This advice was taken, and Erskine Hazard, the intimate friend and business partner of my uncle, Josiah White, went to Wales for that purpose.

As stated in the memoir of Josiah White, by his son-in-law, Richard Richardson: "In 1838 Erskine Hazard went to Wales, and there made himself acquainted with the process and manner of making the anthracite iron, with the machinery and buildings needful for its manufacture. He ordered such machinery as was necessary to be made for the company under the direction of George Crane, the inventor, and engaged David Thomas, who was familiar with the process, to take charge of the erection of the works and the manufacture of the iron. He arrived in the summer of 1839, and to his faithful and intelligent management much of the success of the enterprise is due."

The six furnaces of the Lehigh Crane Iron Company, located on the bank of the Lehigh Canal

SEND FOR ILLUSTRATED



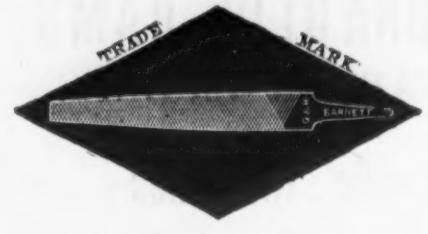
PRICE LIST.

BLACK DIAMOND FILE WORKS.**G. & H. BARNETT,****39, 41 & 43 Richmond Street, PHILADELPHIA.**

SOLE AGENTS:

LINFORTH, KELLOGG & CO., 3 & 5 Front St., San Francisco, for the Pacific Coast.
SEMPLE, BIRGE & CO., 13 South Main St., St. Louis, Mo.

SEND FOR ILLUSTRATED



PRICE LIST.

USE THE BEST.**Pawtucket, R. I.**

The American File Company have the exclusive right to use the Bernot process for cutting files. By this method all the advantages of hand cutting are secured, together with an accuracy unattainable in hand work. They are the only manufacturers who employ machinery for testing files and steel.

Goods of all known manufacturers have been repeatedly tested, and interesting tables have been compiled showing the working qualities of files made by different makers, and of files made from different steels, and with various shapes and angles of tooth. They have thus reduced the manufacture of files to an exactness and perfection with a uniformity of result, as they believe, never before attained. No file, foreign or domestic, that they have ever tested, has equalled the performances of their own goods taken at random from their stock. Their machines are capable of the most delicate adjustment, and can produce the very finest work known to the trade. Special files made to order. Prominent file manufacturers are having their best goods from our works.

Price lists and information furnished on application.

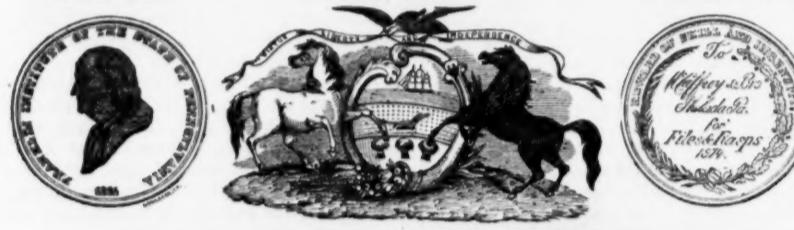
AMERICAN FILE CO., Pawtucket, R. I.**THE BEST IS THE CHEAPEST.**

McCaffrey's Standard American Hand Cut Files and Rasps are warranted to do more work than any other files and rasps in the market.

SILVER MEDAL.

TRADE MARK.

HIGHEST PREMIUM.



L. B. HELLER. I. R. DENMAN.

L. B. HELLER & CO.,

Manufacturers of Celebrated

American Horse Rasps and Files.

OFFICE, 190 Market Street,

P. O. Box, 223. NEWARK, N. J.

ELLIS G. HELLER. JOHN J. HELLER.

PETER J. HELLER.

For the information of persons unacquainted with our goods, we will state that every

FILE OR RASP

manufactured by us since our establishment in 1866, has been stamped "Heller & Bros," though commonly called the "Heller Rasp."

All Rasps not stamped with our name, which was formerly a horse, and is now changed to the trade mark represented by the cut.

Importer and Manufacturer of Steam Water Gauges, Pipe and Fittings, Scotch Glass Tubes, Tube Expanders, Twist Drills, Emery Wheels, Pipe Fitters' Tools, Moulders' Tools, Blacksmiths' Tools, Machinists Fine Tools Forges, Hammers, Wheelbarrows, Wrenches, Jack Screws, Vises, Flue Brushes, Waste, Belting, Hose, Packing, Stubs' Goods, Hair Felt, Polishing Felt, Emery Cloth, Hand Drills, Iron Punches, Iron Shears, Files, Governors, Bolts,

SEND FOR PRICE LIST.

50 and 52 JOHN STREET, NEW YORK. Railroad & Machinists' Supplies.

PENNSYLVANIA FILE WORKS.**McCAFFREY & BRO.,**

No. 1732, 1734 & 1736 North Fourth St., Phila.

Messrs. ARNOLD & CO., 312 California St., San Francisco. Sole Agents for the Pacific Coast.

**Machinery without Lubricant
METALINE.**

Machinery Metalined, or Metaline furnished to Machine Builders.

No oil or attention required. Runs with little or no wear. No dirt or danger from fire. No damage to goods in process of manufacture. Years in use by best concerns, who are refilling old, and ordering new machinery to be metalined.

AMERICAN METALINE COMPANY,
61 Warren Street, New York City.**JOHN I. BROWER & SON,**
Hardware Merchants,
288 Greenwich Street, NEW YORK.

HORSE SHOES.	HORSE NAILS.	HORSE RASPS.
Burke's, Perkins', Snow, Rhode Island, Goodenough, Shoenerger.	Putnam's, Globe, Vulcan, Ausable, Ausable Pointed & Polished, Ausable Pointed & Blued.	Thos. Turner & Co.'s, Sheffield Eng. Winsted, HAY RAKES, Breakenridge's.

**Bemis & Call Hardware & Tool Co.'s
PATENT COMBINATION WRENCH.**

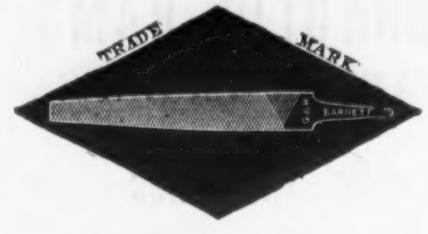
These Wrenches are made from the best of Wrought Iron, with Steel Head and Jaw, Case-Hardened throughout, and not only combine all of the superior qualities of our cylinder or Gas Pipe Wrenches, but also all requisite Combinations of a regular Nut Wrench, thus making a Combination which has no equal. For Circulars and Price List, address,

BEMIS & CALL HARDWARE & TOOL CO., Springfield, Mass.

THE IRON AGE.

WORKS
C & H BARNETT
BLACK DIAMOND

SEND FOR ILLUSTRATED



PRICE LIST.

Established 1816.

Peter A. Frasse & Co.,

95 Fulton Street, New York,

SOLE AGENTS FOR

**Thomas Turner & Co.'s Suffolk Works,
SHEFFIELD.****FILES AND HORSE RASPS,**

And Importers of

P. S. **STUBS' FILES, TOOLS & STEEL,**
W. J. Davies' Sons' London Emery Cloth,
HUBERT'S FRENCH EMERY PAPER.

EVERY FILE WARRANTED.

Equal to the

BEST.

Western Files.
Works, Beaver Falls, Pa.
Western Files.
Office, 96 Chambers St., N.Y.
Western Files.
LARGEST CAPACITY
Of any File Works in the World.
In the face of strong prejudice against American files, this brand has earned a reputation second to none. The trade in all sections testify to their excellence. We confidently offer these files as superior in every respect and cheaper than any first-class file in the market. A trial will confirm our reputation.
MINOT & CO., 239 Franklin St., Boston, New England Agents.

XTRA QUALITY,
MADE FROM THE BEST
FILES {
IMPORTED STEEL
BY THE
RASPS. {
Auburn File Works,
AUBURN, N. Y.

JOHN ROTHERY'S
Celebrated Hand-Cut FILES,

Made of Best English Cast Steel.

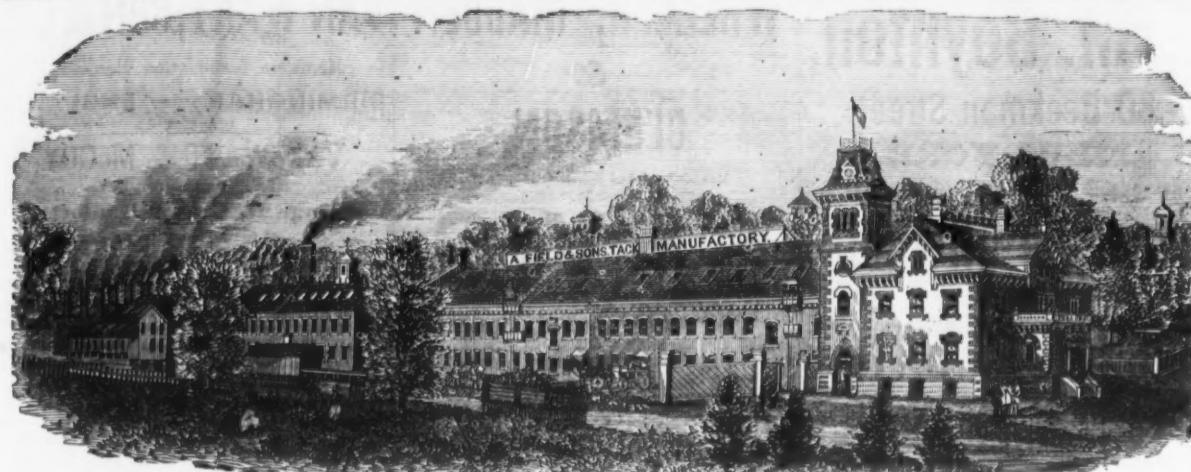
WALSH, COULTER & FLAGLER, Sole Agents,
83 Chambers and 65 Reade Streets, N. Y.**BEST HAND CUT FILES.**

Warranted Superior Quality.

SAGER ASHWORTH & CO., Lowell, Mass.

SEND FOR PRICE LIST.

STEAM GOVERNOR
WARRANTED BEST IN USE
ANDREW HUNTON GOVERNOR CO. LAWRENCE MASS.



A. FIELD & SONS, TAUNTON, MASS., Manufacturers of Copper and Iron Tacks, Tinned Tacks,

SUPERIOR SWEDES IRON TACKS, for Upholsterers' Use, Saddlers' Supply, Card Clothing, etc., etc.

American and Swedes Iron Shoe Nails,

Zinc and steel Shoe Nails, Carpet, Brush and Cimp Tacks, Common and Paten Brads, Finishing Nails
Annealed Trunk and Clout Nails, Hob and Hungarian Nails,

Copper and Iron Boat Nails, Paten Copper Plated Tacks and Nails
Fine Two Penny and Three Penny Nails, Channel, Cigar Box and Chair Nails, Leathered Carpet Tacks,
Glaziers' Points, etc., etc.

OFFICES AND FACTORIES AT TAUNTON, MASS.

WAREHOUSE AT 35 CHAMBERS STREET, NEW YORK, where may be found a full assortment of Tacks, Brads, &c. for the accommodation of the New York Wholesale and Jobbing Trade.

Any variations from the regular size or shape of the above named goods made from samples, to order.

Hopkins & Dickinson Manufacturing Co., FINE METAL WORKERS,

Works, Darlington, N. J.

69 Duane Street, N. Y.

Hand-Made Locks and Real Bronze Hardware.

NEW AND ARTISTIC DESIGNS FOR

Private Residences, Banks, Churches and Public Buildings.

OTIS PASSENGER AND FREIGHT ELEVATORS

For HOTELS, OFFICE BUILDINGS, STORES,
WAREHOUSES, FACTORIES, MINES,
BLAST FURNACES, &c.

OTIS BROTHERS & CO.
SOLE MANUFACTURERS,
348 Broadway, New York

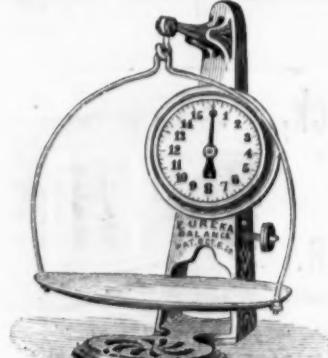
THE
CANADIAN BANK OF
COMMERCE.

Capital - - \$6,000,000, Gold.
Surplus - \$1,800,000, Gold.

The New York Agency, 50 Wall St.,
Buys and sells Sterling Exchange, makes Cable
Transfers, grants Commercial Credits, and transacts
other Banking Business.

J. G. HARPER, Agents.
J. H. GOADBY.

Eureka Self-adjusting



SCALES.

Have a patented attachment for ascertaining the
tare of a dish or other receptacle used in
weighing without the use of weights or loss of
time.

Manufactured only by

JOHN CHATILLON & SONS,
91 & 93 Cliff St., N. Y.

CROCKER BROTHERS, 32 Cliff Street, N. Y.

METALS.

Anthracite Pig Irons,

COLD AND WARM BLAST CHARCOAL IRONS,

American and English Bessemer Irons, Iron Ores.

COPPER, TIN, &c.

Advances made on Merchandise.



YALE LOCKS FOR ALL USES.

ORNAMENTAL REAL BRONZE HARDWARE.

YALE LOCK MFG. CO., Stamford, Ct.

Salesrooms, No. 298 Broadway, NEW YORK.



BUSINESS ITEMS.

NEW JERSEY.

The name of the Union Iron Company, whose mines are at Chester, Morris county, has been changed to the North Jersey Iron Company, by an act of Legislature. They also have the privilege of locating their furnaces in Morris county if they choose.

Among the most important manufacturing establishments at Camden is that of the Esterbrook Steel Pen Company. Employment is given to about 300 hands, many of the pens passing through 25 distinct operations. This company also manufacture pen boxes and holders.

Work has been resumed at the Trenton Vise and Tool Works with a full force. The American Saw Company, which has been working with reduced force, will soon increase it.

PENNSYLVANIA.

Brady's Edge Tool Factory has been removed from Mount Joy to Lancaster, where improved machinery will be introduced. It was established in 1805.

The Rolling Mills of Jas. Hooven & Sons, at Norristown, are about to resume operations after having been idle for nearly two years, the puddlers having agreed to go to work on the \$4 basis. They go to work with a contract for 1000 tons of iron.

Hopewell Furnace, in Berks county, which has been standing idle for some months past, has commenced operations with charcoal and ore on hand sufficient to keep it in operation for seven months.

It is said the workshops of the Northern Central Railroad Company are to be removed from York to Baltimore, Md.

Abel, Peter & Co., proprietors of the new steel works at Beaver Falls, have contracted for their machinery, J. L. Lewis, of Pittsburgh, and Merchants and Mechanics', of Richmond, Va. \$1200 insurance on machinery and stock, \$500 in the Amazon, of Cincinnati, and \$700 in the Citizen's, of Newark. The loss on the machinery and stock will exceed the insurance by over \$2000.

The Hall Safe Company, of Cincinnati, turn out 20 safes per day, and it is their intention soon to increase the number of the employees and the amount of work.

The rivet factory at Cuyahoga is largely increased in capacity, and will replace the planing machinery of Babcock & Son. The other mills and factories are doing an increased amount of work, and cheerfulness has generally taken the place of gloom.

Fifty dozen axes per day, beside picks, mattocks, adzes, and broad axes, are being made by the Powell Tool Company, Cleveland.

The Cuyahoga Iron Works have just completed a 2000 pound steam hammer for the Valley Iron Company.

The Variety Iron Works Company, Cleveland, have a number of engines and boilers under way, and a considerable amount of job work on their floors. They are building a 12-ton rail shear for the Valley Iron Works.

The steel works at Martin's Ferry are idle. There will be a change in the management, when they expect to resume operations.

MAINE.

At the foundry and agricultural implement manufactory of F. C. Merrill, Esq., South Paris, they are now making the Pettengill swivel plow and Pettengill's horse hoe and cultivator. Mr. Merrill has just invented a coulter harrow.

VERMONT.

The Industrial Works Company's machinery building, at Springfield, was totally destroyed by fire about three o'clock the morning of the 28th ult. Origin of the fire unknown. The business was formerly carried on under the name of the Co-operative Manufacturing Company. The building was owned by Brink & Co., and occupied by the Industrial Works Company. Loss total: Insurance on the building, \$3000, divided equally between the Manufacturers, of Newark, Alleghany, of Pittsburgh, and Merchants and Mechanics', of Richmond, Va. \$1200 insurance on machinery and stock, \$500 in the Amazon, of Cincinnati, and \$700 in the Citizen's, of Newark. The loss on the machinery and stock will exceed the insurance by over \$2000.

NEW HAMPSHIRE.

A bill in equity has been filed in the circuit court, Portsmouth, for the district of New Hampshire, by the Locomotive Engine Safety Truck Company against the Manchester Locomotive Works for an alleged infringement of a patent owned by the company, originally granted to Alba F. Smith, for an improvement in locomotive trucks.

OREGON.

The Oregon Iron Works, of Portland, have been awarded the contract for building a new revenue steamer for service on the Pacific coast. The vessel is to be a staunch one, 145 feet long, 23 feet beam, with 11 feet depth of hold, and to cost \$92,000, currency.

ILLINOIS.

The Joliet Iron and Steel Company produced the other week 1287 tons of steel ingots, beside 965 tons of rails for the Grand Trunk Railroad of Canada.

ONTARIO.

The extensive foundry owned by Cain & Eldridge, Newmarket, together with a large number of cottages occupied by workmen, was burned May 3. Loss \$25,000; no insurance.

ARKANSAS.

The street railway company at Hot Springs is manufacturing cars at that place for use upon its road.

CALIFORNIA.

The old iron foundry and the sand house of the Central Pacific Railroad shops, in Sacramento, was burned April 24. Loss about \$10,000.

Ice Manufacture.

The Chattanooga Commercial thus describes a new ice factory in that city: The building is rectangular, built substantially of brick, and heavily white coated on the outside. The interior is divided into boiler and engine room, freezing room, storage room and office. There are several longitudinal boilers, in which is generated the ammoniated vapor which is the freezing agent. These boilers connect with the freezing chamber by piping. In this chamber are set, three feet apart each way, 100 perpendicular pipes, about one and one-half inches in diameter and 15 feet high, the whole forming, by means of horizontal pipes at top and bottom, a continuous tube from end to end to the boilers. The ammoniated vapor forced constantly, while the factory is in operation, through this circulatory tubing, produces intense cold, several degrees below the point at which ice forms naturally on exposed water. Water is kept falling into this room all the time from a raining apparatus overhead, so nicely regulated that no more falls than is rapidly congealed around the upright pipes as a nucleus. When ice has formed to the extent of about two tons to each column, it is cut away and stored. The capacity of the factory here is about five tons per day, or a total of two hundred tons in forty days.

The Fitchburg Machine Company have been very successful with their machinists' tools abroad, in the Canadas, and in the various centers of the Union. They have recently shipped a large order for the Havana Railroad, Cuba. Up to 1872 their machinists' tools were for railroads, but now their orders come in from individual machinists in all quarters of the globe. The Franconia Iron Company, of Wrentham, have a large contract to furnish the iron for the New York suspension bridge.

OHIO.

The Cherry Valley Iron Company, at Leetonia, started their rolling mill in full force a few days ago, giving employment to about 100 men.

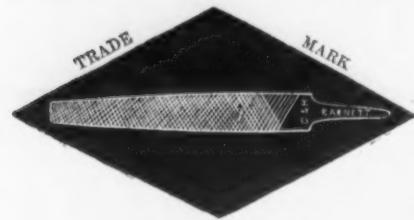
Three hundred men are employed at the Cleveland Iron Company's blast furnaces and rolling mill, on the Cuyahoga River. They are making 35 tons of pig metal daily, a quantity of rails and a large amount of merchant iron and fish bar.

The Austin Powder Company, Cleveland, intend to rebuild their works, recently destroyed by an explosion.

The Cedar Point Iron Company's furnace, at Port Henry, improved by the addition of four Whitwell stoves, will be blown in on the 1st of Aug. next. The furnace will be run on Bessemer pig; new red ore (magnetic) and anthracite fuel will be used.

The pig iron industry in England is in a terribly depressed condition. Of 149 blast furnaces in the South Staffordshire district, 79 were, according to the latest mail advices, in blast and 70 out. Of 150 furnaces in the North of England, 125 are blowing and 32 are silent.

SEND FOR ILLUSTRATED



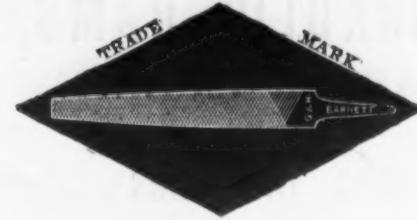
PRICE LIST.

BLACK DIAMOND FILE WORKS.**G. & H. BARNETT,****39, 41 & 43 Richmond Street, PHILADELPHIA.**

SOLE AGENTS:

LINFORTH, KELLOGG & CO., 3 & 5 Front St., San Francisco, for the Pacific Coast.
SIMPLE, BIRGE & CO., 13 South Main St., St. Louis, Mo.

SEND FOR ILLUSTRATED



PRICE LIST.

USE THE BEST.**Pawtucket, R. I.**

The American File Company have the exclusive right to use the Bernot process for cutting files. By this method all the advantages of hand cutting are secured, together with an accuracy unattainable in hand work. They are the only manufacturers who employ machinery for testing files and steel.

Goods of all known manufacturers have been repeatedly tested, and interesting tables have been compiled showing the working qualities of files made by different makers, and of files made from different steels, and with various shapes and angles of tooth. They have thus reduced the manufacture of files to an exactness and perfection with uniformity of result, as they believe, never before attained. No file, foreign or domestic, that they have ever tested, has equalled the performances of their own goods taken at random from their stock. Their machines are capable of the most delicate adjustment, and can produce the very finest work known to the trade. Special files made to order. Prominent file manufacturers are having their best goods from our works.

Price lists and information furnished on application.

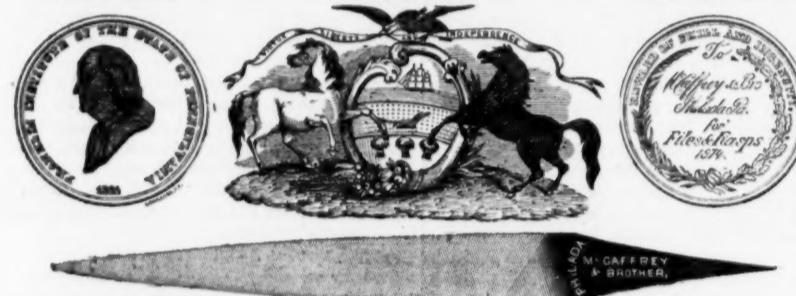
AMERICAN FILE CO., Pawtucket, R. I.**THE BEST IS THE CHEAPEST.**

McCaffrey's Standard American Hand Cut Files and Rasps are warranted to do more work than any other files and rasps in the market.

SILVER MEDAL.

TRADE MARK.

HIGHEST PREMIUM.

**PENNSYLVANIA FILE WORKS.**
McCAFFREY & BRO.,

No. 1732, 1734 & 1736 North Fourth St., Phila.

Messrs. ARNOLD & CO., 312 California St., San Francisco. Sole Agents for the Pacific Coast.

Machinery without Lubricant
METALINE.

Machinery Metalined, or Metaline furnished to Machine Builders.

No oil or attention required. Runs with little or no wear. No dirt or danger from fire. No damage to goods in process of manufacture. Years in use by best concerns, who are refilling old, and ordering new machinery to be metalined.

AMERICAN METALINE COMPANY,
61 Warren Street, New York City.**JOHN I. BROWER & SON,**
Hardware Merchants,
288 Greenwich Street, NEW YORK.HORSE SHOES.
Barden's.
Perkins'.
Perry's.
Hoag Island.
Goodensough.
Shoeberger.HORSE NAILS.
Putnam's.
Globe.
Vulcan.
Ausable.
Ausable Pointed & Polished.
Ausable Pointed & Blued.HORSE RASPS.
Thos. Turner & Co.'s.
Sheffield Eng.
Winsted.
TOE CALKS.
HAY RAKES.
Breakenridge's.

Bemis & Call Hardware & Tool Co.'s
PATENT COMBINATION WRENCH.
This Wrench can be furnished with
Bridge' Pat. Nat. or Sleeve.

These Wrenches are made from the best of Wrought Iron, with Steel Head and Jaw, Case-Hardened throughout, and not only combine all of the superior qualities of our cylinder or Gas Pipe Wrenches, but also all requisite Combinations of a regular Nut Wrench, thus making a Combination which has no equal.

For Circulars and Price List, address,

BEMIS & CALL HARDWARE & TOOL CO., Springfield, Mass.

L. B. HELLER. I. R. DENMAN.

L. B. HELLER & CO.,

Manufacturers of Celebrated

American Horse Rasps and Files.

OFFICE, 190 Market Street,

P. O. Box, 223. NEWARK, N. J.

ELIAS G. HELLER. GEO. E. HELLER.

PETER J. HELLER. JOHN J. HELLER.

For the information of persons unacquainted with our goods, we will state that every

FILE OR RASP

manufactured by us since our establishment in 1866, has been stamped "HELLER & CO." or "L. B. HELLER", commonly called the "Heller Rasp".

All Rasps not stamped as annexed diagram are not the original, genuine article. The trade will please note the relation to our trade mark, which was formerly a horse, and is now changed to the trade mark represented by the cut.

Importer and Manufacturer of Steam Water Gauges, Pipe and Fittings, Scotch Glass Tubes, Tube Expanders, Twist Drills, Emery Wheels, Pipe Fitters' Tools, Moulders' Tools, Blacksmiths' Tools, Machinists Fine Tools Forges, Hammers, Wheelbarrows, Wrenches, Jack Screws, Vises, Flue Brushes, Waste, Belting, Hose, Packing, Stubs' Goods, Hair Felt, Polishing Felt, Emery Cloth, Hand Drills, Iron Punches, Iron Shears, Files, Governors, Bolts, SEND FOR PRICE LIST.

Clement & Hawkes Mfg. Co.,
Manufacturers of**SHOVELS.**

Planters' Hoes, Trowels and Machinery.

Northampton, Mass.

Send for Circular and Price List.

FLUOR SPAR

In Lump, Crushed, Ground, or extra fine, for sale by pound, barrel, ton or car load, by

SCHWEITZER MFG. CO.,
57 Reade St., N. Y.**STEAM GOVERNOR**
WARRANTED BEST IN USE.
AUBREY HUNTINGTON REVERE LTD. LAWRENCE MASS.

Established 1816.

Peter A. Frasse & Co.,

95 Fulton Street, New York,

SOLE AGENTS FOR

Thomas Turner & Co.'s Suffolk Works,
SHEFFIELD.**FILES AND HORSE RASPS,**

And Importers of

P. S. STUBS' FILES, TOOLS & STEEL,
W. J. Davies' Sons' London Emery Cloth,
HUBERT'S FRENCH EMERY PAPER.

EVERY FILE WARRANTED.

Equal to the

BEST.

Western Files.

Works, Beaver Falls, Pa.

Western Files.

Office, 96 Chambers St., N.Y.

LARGEST CAPACITY

Of any File Works in the World.

In the face of strong prejudice against American files, this brand has earned a reputation second to none. The trade in all sections testify to their excellence. We confidently offer these files as superior in every respect and cheaper than any first-class file in the market. A trial will confirm their reputation.

MINOT & CO., 239 Franklin St., Boston, New England Agents.

XTRA QUALITY,
MADE FROM THE BEST
IMPORTED STEEL
BY THE
RASPS.

Auburn File Works,

AUBURN, N. Y.

JOHN ROTHERY'S
Celebrated Hand-Cut FILES,

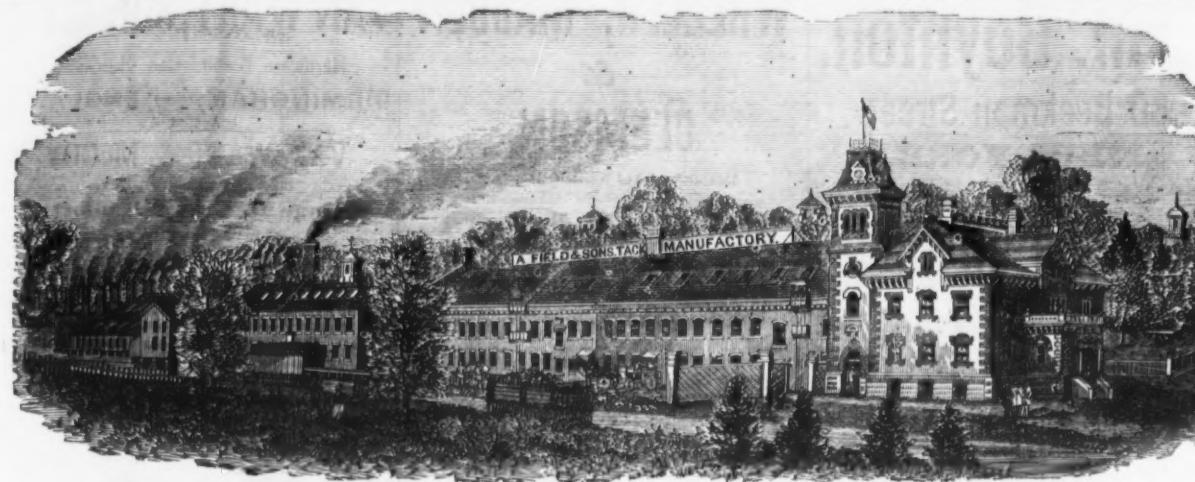
Made of Best English Cast Steel.

WALSH, COULTER & FLAGLER, Sole Agents,
83 Chambers and 65 Reade Streets, N. Y.**BEST HAND CUT FILES.**

Warranted Superior Quality.

SAGER ASHWORTH & CO., Lowell, Mass.

SEND FOR PRICE LIST.



A. FIELD & SONS, TAUNTON, MASS., Manufacturers of Copper and Iron Tacks, Tinned Tacks,

SUPERIOR SWEDES IRON TACKS, for Upholsterers' Use, Saddlers' Supply, Card Clothing, etc., etc.

American and Swedes Iron Shoe Nails,

Zinc and Steel Shoe Nails, Carpet, Brush and Cimp Tacks, Common and Patent Brads, Finishing Nails, Annealed Trunk and Clout Nails, Hob and Hungarian Nails,

Copper and Iron Boat Nails, Patent Copper Plated Tacks and Nails, Fine Two Penny and Three Penny Nails, Channel, Cigar Box and Chair Nails, Leathered Carpet Tacks, Glaziers' Points, etc., etc.

OFFICES AND FACTORIES AT TAUNTON, MASS.

WAREHOUSE AT 35 CHAMBERS STREET, NEW YORK, where may be found a full assortment of Tacks, Brads, &c. for the accommodation of the New York Wholesale and Jobbing Trade.

Any variations from the regular size or shape of the above named goods made from samples, to order.

Hopkins & Dickinson Manufacturing Co., FINE METAL WORKERS,

Works, Darlington, N. J.

69 Duane Street, N. Y.

Hand-Made Locks and Real Bronze Hardware.

NEW AND ARTISTIC DESIGNS FOR

Private Residences, Banks, Churches and Public Buildings.

OTIS PASSENGER —AND— OTIS FREIGHT ELEVATORS

FOR HOTELS, OFFICE BUILDINGS, STORES,
WAREHOUSES, FACTORIES, MINES,
BLAST FURNACES, &c.

OTIS BROTHERS & CO.
SOLE MANUFACTURERS,
348 Broadway, New York.

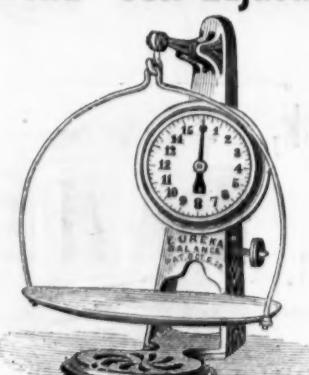
THE CANADIAN BANK OF COMMERCE.

Capital - - \$6,000,000, Gold.
Surplus - \$1,800,000, Gold.

The New York Agency, 50 Wall St.,
Buys and sells Sterling Exchange, makes Cable
Transfers, grants Commercial Credits, and transmits
other Banking Business.

J. G. HARPER,
J. H. GOADBY, Agents.

Eureka Self-adjusting



SCALES.

Have a patented attachment for ascertaining the *time* of a *dish* or other receptacle used in weighing without the use of *weights* or *loss* of *time*. Manufactured only by

JOHN CHATILLON & SONS,
91 & 93 Cliff St., N. Y.

CROCKER BROTHERS, 32 Cliff Street, N. Y.

METALS.

Anthracite Pig Irons,
COLD AND WARM BLAST CHARCOAL IRONS,
American and English Bessemer Irons, Iron Ores.

COPPER, TIN, &c.

Advances made on Merchandise.

THE CELEBRATED



YALE LOCKS FOR ALL USES.

ORNAMENTAL REAL BRONZE HARDWARE.

YALE LOCK MFG. CO., Stamford, Ct.

Salesrooms, No. 298 Broadway, NEW YORK.



BUSINESS ITEMS.

NEW JERSEY.

The name of the Union Iron Company, whose mines are at Chester, Morris county, has been changed to the North Jersey Iron Company, by an act of Legislature. They also have the privilege of locating their furnaces in Morris county if they choose.

Among the most important manufacturing establishments at Camden is that of the Estebrook Steel Pen Company. Employment is given to about 300 hands, many of the pens passing through 25 distinct operations. This company also manufacture pen boxes and holders.

Work has been resumed at the Trenton Vise and Tool Works with a full force. The American Saw Company, which has been working with reduced force, will soon increase it.

PENNSYLVANIA.

Brady's Edge Tool Factory has been removed from Mount Joy to Lancaster, where improved machinery will be introduced. It was established in 1865.

The Rolling Mills of Jas. Hooven & Sons, at Norristown, are about to resume operations after having been idle for nearly two years, the puddlers having agreed to go to work on the \$4 basis. They go to work with a contract for 1000 tons of iron.

Hopewell Furnace, in Berks county, which has been standing idle for some months past, has commenced operations with charcoal and ore on hand sufficient to keep it in operation for seven months.

It is said the workshops of the Northern Central Railroad Company are to be removed from York to Baltimore, Md.

Abel, Peter & Co., proprietors of the new steel works at Beaver Falls, have contracted for their machinery, J. L. Lewis, of Pittsburgh, securing the contract for rolls, &c.

Dunbar Furnace is blowing away, making foundry iron from native ores exclusively, but will soon make forge iron, as mill cinder and Lake ores are being received. There is a slag granulator at this furnace, and the granulated slag is being sent out every day for the Connellsburg Railroad Company.

Mann's Axe Factory, at the Boiling Spring, near Bellefonte, has been leased by Robert Mann, of Mill Hall, and will be managed by Fearon Mann, of Lewistown.

The Charcoal Furnace of Messrs. Barlow & Day, at Lamar, Clinton county, has blown out. It is known as the Washington Furnace, and has a capacity of 1200 gross tons per annum. In connection with the furnace is a bloomery of eight fires, which has also suspended operations.

The Sophia and one of the Etna furnaces are the only ones now out of blast at New Castle. The former has been entirely remodeled, and is now one of the best furnaces in that city.

The rail mill at the Pennsylvania Steel Works, Baldwin, is to be run day and night shortly.

One hundred and seventy-five tons of rails are turned out at the Pennsylvania Steel Works, Harrisburg, every twenty-four hours. The average when only "day turns" prevailed, was ninety-five tons.

At Roach's shipyard, Chester, two of the eight sloops-of-war, constructed under the act Congress, are building. Both are well underway. The double-turreted monitor, Miantonomi, is also rebuilding, and will be entirely of iron. Her engines and turret will again be used. During the winter five old monitors, the Nansett, Niobe, Cohoes, Modoc and Napa, were broken up at the yard, the iron in them being sold by the government. For this work a large force of men was kept employed during the dull season. There are now in course of construction at the yard three additional iron steamships for the Pacific Mail Steamship Company. They will each have a tonnage of 3500 tons.

Dunbar Furnace, Fayette county, Pa., is blowing away, making foundry iron from native ores exclusively, but will soon make forge iron, as the mill cinder and Lake ores are being received. There is a slag granulator at this furnace, and the granulated slag is being sent out every day for the Connellsburg Railroad Company.

MASSACHUSETTS.

The Hopedale Machine Works are to be enlarged by the addition of 26 feet in width their entire length of 150 feet. This company have six months' orders ahead, and are enjoying a high degree of prosperity.

The Knowles Pump Works, at Warren, are building an immense mining pump, the largest in the world, to go on the Pacific Coast. This pump will lift water 1000 feet high. The works at Warren are taxed to their utmost capacity to fill orders now in.

The Fitchburg Machine Company have been very successful with their machinists' tools abroad, in the Canadas, and in the various centers of the Union. They have recently shipped a large order for the Havana Railroad, Cuba. Up to 1872 their machinists' tools were for railroads, but now their orders come from individual machinists in all quarters of the globe.

The Franconia Iron Company, of Wareham, have a large contract to furnish the iron for the New York suspension bridge.

OHIO.

The Cherry Valley Iron Company, at Leetonia, started their rolling mill in full force a few days ago, giving employment to about 100 men.

Three hundred men are employed at the Cleveland Iron Company's blast furnaces and rolling mill, on the Cuyahoga River. They are making 35 tons of pig metal daily, a quantity of rails and a large amount of merchant iron and fish bar.

The Austin Powder Company, Cleveland, intend to rebuild their works, recently destroyed by an explosion.

The Hall Safe Company, of Cincinnati, turn out 20 safes per day, and it is their intention soon to increase the number of the employees and the amount of work.

The rivet factory at Cuyahoga is largely increased in capacity, and will replace the planing machinery of Babcock & Son. The other mills and factories are doing an increased amount of work, and cheerfulness has generally taken the place of gloom.

Fifty dozen axes per day, beside picks, mattocks, adzes, and broad axes, are being made by the Powell Tool Company, Cleveland.

The Cuyahoga Iron Works have just completed a 2000 pound steam hammer for the Valley Iron Company.

The Variety Iron Works Company, Cleveland, have a number of engines and boilers under way, and a considerable amount of job work on their floors. They are building a 12-ton rail shear for the Valley Iron Works.

The steel works at Martin's Ferry are idle. There will be a change in the management, when they expect to resume operations.

MAINE.

At the foundry and agricultural implement manufacturer of F. C. Merrill, Esq., South Paris, they are now making the Pettengill swivel plow and Pettengill's horse hoe and cultivator. Mr. Merrill has just invented a coulter harrow.

VERMONT.

The Industrial Works Company's machinery building, at Springfield, was totally destroyed by fire about three o'clock the morning of the 28th ult. Origin of the fire unknown. The business was formerly carried on under the name of the Co-operative Manufacturing Company. The building was owned by Brink & Co., and occupied by the Industrial Works Company. Loss total: Insurance on the building, \$3000, divided equally between the Manufacturers, of Newark, Allemania, of Pittsburgh, and Merchants and Mechanics, of Richmond, Va. \$1200 insurance on machinery and stock, \$500 in the Amazon, of Cincinnati, and \$700 in the Citizen's, of Newark. The loss on the machinery and stock will exceed the insurance by over \$2000.

NEW HAMPSHIRE.

A bill in equity has been filed in the circuit court, Portsmouth, for the district of New Hampshire, by the Locomotive Engine Safety Truck Company against the Manchester Locomotive Works for an alleged infringement of a patent owned by the company, originally granted to Alba F. Smith, for an improvement in locomotive trucks.

OREGON.

The Oregon Iron Works, of Portland, have been awarded the contract for building a new revenue steamer for service on the Pacific coast. The vessel is to be a staunch one, 145 feet long, 23 feet beam, with 11 feet depth of hold, and to cost \$92,000, currency.

ILLINOIS.

The Joliet Iron and Steel Company produced the other week 1287 tons of steel ingots, besides 965 tons of rails for the Grand Trunk Railroad of Canada.

ONTARIO.

The extensive foundry owned by Cain & Eldridge, Newmarket, together with a large number of cottages occupied by workmen, was burned May 3. Loss \$25,000; no insurance.

ARKANSAS.

The street railway company at Hot Springs is manufacturing cars at that place for use upon its road.

CALIFORNIA.

The old iron foundry and the sand house of the Central Pacific Railroad shops, in Sacramento, was burned April 24. Loss about \$10,000.

Ice Manufacture.

The Chattanooga Commercial thus describes a new ice factory in that city: The building is rectangular, built substantially of brick, and heavily white coated on the outside. The interior is divided into boiler and engine room, freezing room, storage room and office. There are several longitudinal boilers, in which is generated the ammoniated vapor which is the freezing agent. These boilers connect with the freezing chamber by piping. In this chamber are set, three feet apart each way, 100 perpendicular pipes, about one and one-half inches in diameter and 15 feet high, the whole forming, by means of horizontal pipes at top and bottom, a continuous tube from end to end to the boilers. The ammoniated vapor forced constantly, while the factory is in operation, through this circulatory tubing, produces intense cold, several degrees below the point at which ice forms naturally on exposed water. Water is kept falling into this room all the time from a raining apparatus overhead, so nicely regulated that no more falls than is rapidly congealed around the upright pipes as a nucleus. When ice has formed to the extent of about two tons to each column, it is cut away and stored. The capacity of the factory here is about five tons per day, or a total of two hundred tons in forty days.

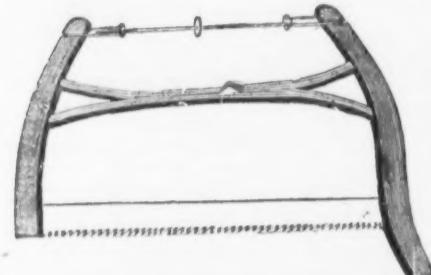
In quality the ice is the best. We saw there the other day columns three feet thick almost transparent. From actual experiment, it is known to stand transportation with at least no greater loss than the best article of carefully packed lake ice. It has the additional merit of entire freedom from impurities.

The Cedar Point Iron Company's furnace, at Port Henry, improved by the addition of four Whitwell stoves, will be blown in on the 1st of August next. The furnace will be run on Bessemer pig; new red ore (magnetic) and anthracite fuel will be used.

The pig iron industry in England is in a terribly depressed condition. Of 149 blast furnaces in the South Staffordshire district, 79 were, according to the latest mail advices, in blast and 70 out. Of 150 furnaces in the North of England, 125 are blowing and 32 are silent.

GEORGE GUEUTAL & SON,
39 West 4th St., New York.
IMPORTER OF
Wood Screws, Steel in Sheets,
BAND SAWS, TOOLS FOR BRAZING, &c.
Bed Screws, Pin Hinges, and Wire Nails a Specialty.

H. W. PEACE,
MANUFACTURER OF
Saws of all kinds.
FACTORY, WILLIAMSBURGH, N. Y.



Elliptic Forked Saw Frame.
Patented June 25th, 1870.

The annexed engraving represents my ELLIPTIC FORKED SAW FRAME, which commends itself to the trade for its simplicity of construction. The Forked Brace being all in one piece, without any center bolt, secures for the Frame great strength and durability. These Frames are put up with my best Webs, marked "No. 40, Harvey W. Peace."

HARVEY W. PEACE,
Sole Proprietor & Manufacturer,
VULCAN SAW WORKS,
WILLIAMSBURGH, N. Y.

**THE SILVER STEEL
DIAMOND CROSS-CUT SAW.**

\$1.50 Per Foot.

Patent Secured

THIS new Saw, which is destined to take the place of all Cross-cut Saws in point of SPEED AND EASE, is manufactured by E. C. ATKINS & CO., Indianapolis, Ind., who are the SOLE MANUFACTURERS FOR THE UNITED STATES. So confident are we that this is the best Cross-cut Saw in the market that we CHALLENGE THE WORLD. Orders promptly filled.

E. C. ATKINS & CO.
Saw Manufacturers and Repairers, Indianapolis, Ind.

**Lloyd, Supplee & Walton,
HARDWARE FACTORS.**

MANUFACTURERS OF

Bonney's Hollow

AUGERS.

Stearns' Hollow Augers
and Saw Vises

Bonney's Spoke Trimmers
Double Edge Spoke Shaves
Adjustable Gate Hinges
Scandinavian Pad Locks

Flat Key Brass and Iron Pad Locks, &c., &c.

625 Market St., Phila., Pa.

BILLINGS & SPENCER CO.

MANUFACTURERS OF

CLAMP, DIE AND COMMON

LATHE DOGS.



Vienna, 1873.

Forged from Bar Steel
And Hardened



For Progress.
Billings' Patent Process.

FIRST CLASS ARTICLES.

and something that every machinist and Tool Maker will appreciate.

Also, all Descriptions of Wrought Iron & Steel

DROP FORGINGS.

For Machine Handles, Lathe Wrenches, Spinning Rings, Marlin Spikes, Clinch Rings, Thumb Screws, Thumb Nuts, and Parts of Drill Chucks, Sewing Machines, Guns, Pistols, and

Machinery Generally.

TRADE B MARK.

THE BILLINGS PATENT SEWING MACHINE SHUTTLE,
Thirty Varieties now made, Forged Solid from Bar Steel and Cold Pressed. Also,
Barwick



Patent Self-Adjusting PIPE WRENCHES, of all sizes.
Illustrated Circulars and Price List sent to any order on request.

Lawrence St., Hartford, Conn.

E. M. Boynton,

80 Beekman Street,
NEW YORK,

Manufacturer of

Saws of all kinds.
Also Sole Manufacturer of

LIGHTNING SAWS.

Two Direct Cutting Edges, instead of one Scraping point.



Note extra steel and durability over the old V, outlined on M tooth.

TELEGRAM DATED OCT. 1ST, 1874.

STATE FAIR, EASTON, PA.

TO HENRY DISSTON & SONS:

Philadelphia, Pa.

I want you to publicly test that challenge on Cross Cut Saws. Name time and place within thirty days. American Institute preferred. E. M. BOYNTON.

E. M. Boynton gave on Wednesday of last week an exhibition of what his Lightning Saw could do at the Pennsylvania State Fair, in which two men sawed through a sound oak log, 16 inches in diameter, in 17 seconds. Mr. Boynton informs us that his export trade is increasing, he having lately made large shipments of his saws to Australia and other distant markets.—*The Iron Age*, Oct. 8, 1874.

For fuller report of this exhibition see the *Easton Morning Dispatch* of Oct. 1st, 1874.

Henry Disston & Sons cannot furnish Lightning Saws. Why do they imitate mine?

J. FLINT,
Manufacturer of
**ALL KINDS OF
SAWS**

And Plastering Trowels,
ROCHESTER, N. Y.

A large Stock of Cross Cut Saws constantly on hand. Orders filled promptly. Dietrich's Double Action Saws are made in all sizes and any kind of tooth desired. Our patent method of grinding Hand Saws makes them superior to any in the market. Send for Illustrated Price List.



Putnam's Government Standard
FORGED

HORSE SHOE NAILS.

Manufactured from the best of NORWAY Iron, and warranted to give entire satisfaction.

S. S. PUTNAM & CO.,
NEPONSET, MASS.

**Rogers' Self-Sharpening
HOE.**

The best Hoe in market. It will not batter or break. Wears itself sharp. Will last twice as long as any other Hoe, and is warranted to cut the "Bolles Hoe" or any Hoe in market.

For Sale at Manufacturers' Prices by

RUSSELL & ERWIN MFG. CO., - - - New York.

BYRNE & FITZSIMONS, - - - Albany, N. Y.

KENNEDY, SPAULDING & CO., - - - Syracuse, N. Y.

A. PARDEE, Hazleton, Pa. J. G. FELL, Phila.

A. PARDEE & CO.,

303 Walnut St.,

PHILADELPHIA.

MINERS AND SHIPPERS OF

Lehigh Coals.

The following superior and well-known Lehigh Coals are mined by ourselves, and firms connected with us, viz.

A. Pardee & Co. HAZLETON, CRANBERRY, SUGAR LOAF

G. B. Markle & Co. JEDDO, HIGHLAND,

Pardee, Bro. & Co. LATTIMER

OFFICES:

WM. LILLY, Mauch Chunk, Pa.

WM. MERSHON, Agent, 111 Broadway N.Y.

WM. H. DAVIS, Agent, Easton, Pa.

**WHEELER, MADDEN
&**

CLEMSON,

Manufacturers of Warranted Cast Steel

SAWS

of every description,
including

Circular, Shingle, Cross Cut,

Mill, Hand, Roberts' and

other Wood Saws,

&c., &c.

Cast Steel Files

of the well known brand of

Wheeler, Madden & Clemson.

FACTORIES:

Middletown, Orange Co., N. Y.

BRANCH OFFICE:

97 Chambers Street, New York.

BRUNDAGE FORGED HORSE NAILS,

Manufactured from

BEST NORWAY IRON,

by BRUNDAGE & CO. Sold by

WHEELER, MADDEN & CLEMSON

Middletown, Orange Co., N. Y.

FULL SIZE 07-12-16-20-24-30-36-42-48-54-60-72-84-100-120-144-168-192-216-240-264-288-312-336-360-384-408-432-456-480-504-528-544-568-584-608-624-640-656-672-688-704-720-736-752-768-784-800-816-832-848-864-880-896-912-928-944-960-976-992-1008-1024-1040-1056-1072-1088-1104-1120-1136-1152-1168-1184-1200-1216-1232-1248-1264-1280-1296-1312-1328-1344-1360-1376-1392-1408-1424-1440-1456-1472-1488-1504-1520-1536-1552-1568-1584-1592-1608-1624-1640-1656-1672-1688-1704-1720-1736-1752-1768-1784-1800-1816-1832-1848-1864-1880-1896-1912-1928-1944-1960-1976-1992-2008-2024-2040-2056-2072-2088-2104-2120-2136-2152-2168-2184-2200-2216-2232-2248-2264-2280-2296-2312-2328-2344-2360-2376-2392-2408-2424-2440-2456-2472-2488-2496-2504-2512-2520-2536-2544-2552-2560-2576-2584-2592-2600-2616-2632-2648-2664-2680-2696-2712-2728-2744-2760-2776-2792-2808-2824-2840-2856-2872-2888-2896-2904-2912-2928-2944-2960-2976-2992-3008-3024-3040-3056-3072-3088-3096-3104-3120-3136-3152-3168-3184-3192-3208-3224-3240-3256-3272-3288-3296-3304-3320-3336-3352-3368-3384-3392-3408-3424-3440-3456-3472-3488-3496-3504-3520-3536-3552-3568-3584-3592-3600-3616-3632-3648-3664-3680-3696-3712-3728-3744-3760-3776-3792-3808-3824-3840-3856-3872-3888-3896-3904-3920-3936-3952-3968-3984-3992-4008-4024-4040-4056-4072-4088-4096-4104-4120-4136-4152-4168-4184-4192-4208-4224-4240-4256-4272-4288-4296-4304-4320-4336-4352-4368-4384-4392-4408-4424-4440-4456-4472-4488-4496-4504-4520-4536-4552-4568-4584-4592-4600-4616-4632-4648-4664-4680-4696-4712-4728-4744-4760-4776-4792-4808-4824-4840-4856-4872-4888-4896-4904-4920-4936-4952-4968-4984-4992-5008-5024-5040-5056-5072-5088-5096-5104-5120-5136-5152-5168-5184-5192-5208-5224-5240-5256-5272-5288-5296-5304-5320-5336-5352-5368-5384-5392-5408-5424-5440-5456-5472-5488-5496-5504-5520-5536-5552-5568-5584-5592-5600-5616-5632-5648-5664-5680-5696-5712-5728-5744-5760-5776-5792-5808-5824-5840-5856-5872-5888-5896-5904-5920-5936-5952-5968-5984-5992-5998-6008-6024-6040-6056-6072-6088-6096-6104-6120-6136-6152-6168-6184-6192-6208-6224-6240-6256-6272-6288-6296-6304-6320-6336-6352-6368-6384-6392-6408-6424-6440-6456-6472-6488-6496-6504-6520-6536-6552-6568-6584-6592-6600-6616-6632-6648-6664-6680-6696-6712-6728-6744-6760-6776-6792-6808-6824-6840-6856-6872-6888-6896-6904-6920-6936-6952-6968-6984-6992-6998

Cutlery.**John Russell Cutlery Co.,**

FACTORIES AND OFFICE,

TURNERS FALLS, MASS.

Manufacturers of

**TABLE CUTLERY,
Butcher, Painters' and Druggists' Knives**

IN GREAT VARIETY

Extra Hard Rubber Handle Table Cutlery of our own Manufacture.

Fine Ivoride Handle Table Cutlery, very White and Durable.

Sample Office, 77 Chambers St., N. Y.

NORTHAMPTON CUTLERY CO.,

Manufacturers of all kinds

American Table Cutlery,

Cook, Butcher, Shoe and Hunting Knives. Sole Agents for Rogers' Cutlery Co.

Plated Forks and Spoons. D. P. GRIFFITH, Manager, 45 Murray Street, N. Y.

FRIEDMANN & LAUTERJUNG,

MANUFACTURERS OF

Pen and Pocket Cutlery, Solid Steel Scissors, F. & L. Shears, Razors, Russia Leather Straps, Oil and Water Hones, &c.

Sole Proprietors of the renowned full concaved patent

"ELECTRIC RAZORS."

Also Agents for the BENGALL RAZORS.

American Table Cutlery, Butcher Knives, &c.

14 Warren Street, NEW YORK. 423 N. Fifth Street, ST. LOUIS, MO.

TABLE KNIVES AND FORKS OF ALL KINDS,

AND EXCLUSIVE MAKERS OF



And the "Patent Ivory" or Celluloid Knife. These Handles never get loose, are not affected by hot water, and are the most durable knives known. Always call for the Trade Mark "MERIDEN CUTLERY COMPANY" on the blade. Warranted and sold by all dealers in Cutlery, and by the MERIDEN CUTLERY CO., 49 Chambers Street, New York.

THE MILLER BROTHERS CUTLERY CO.,

Manufacturers of

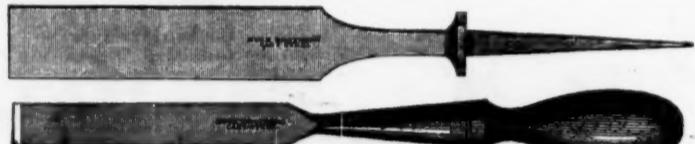
PATENT FINE PEN & POCKET CUTLERY

WEST MERIDEN, CONN.

The only knives made that are put together in such a manner that there is no strain on the covering or frail part of the knife. We warrant our knives equal in cutting qualities and workmanship to any made, and are acknowledged by English makers as the **Best American Knife**. We also make

NICKEL & SILVER PLATED POCKET KNIVES

which will not rust or become discolored when used as a Fruit Knife, and their cutting qualities are equal to any other knife. Orders filled from the factory, and in New York by **Messrs. J. Clark Wilson & Co.**, No. 81 Beckman Street (who have a full stock of all patterns always on hand), and also by **Messrs. G. B. Walbridge & Co.**, No. 99 Chambers Street.

**BUCK BROTHERS, Millbury, Mass.**

The most complete assortment in the U. S. of Shank, Socket Firmer, and Socket Framing Chisels.

PLANE IRONS.

Gongs of all lengths, and circles beveled inside or outside. Nail Sets, Scratch and Belt Awls, Chisel Handles of all kinds. Orders filled promptly; generally same day as received.

ROGERS & BRO.,

MANUFACTURERS OF THE

**Celebrated Silver Plated Goods,
FORKS, SPOONS, HOLLOWWARE, &c.,
STAMPED****"ROGERS & BRO. A 1,"**

which they are now offering at greatly reduced prices.

Price Lists and Discounts mailed on receipt of business card or reference. Address

P. O. Box 320. 203 Broadway, New York

ESTABLISHED 1852.

NEW YORK KNIFE CO.

MANUFACTURERS OF SUPERIOR

Table & Pocket Cutlery,

WARRANTED TO BE MADE OF THE BEST

MATERIAL.

WALKILL RIVER WORKS,

Walden, Orange Co., New York.

THOS. J. BRADLEY, Pres'tl.

**AMERICAN
PEN AND POCKET KNIVES,**MANUFACTURED BY **PEPPERELL,**Aaron Burkinshaw. **AB** MASSACHUSETTS

My Blades are forged from the best Cast Steel, and
warranted. To me was awarded the GOLD MEDAL of
the Connecticut State Agricultural Society; also a medal
and Diploma from the Mass. Mechanics' Ass'n Sept. 1860.

Wood's Hot Water-Proof Table Cutlery.

Handsomest, Cheapest, most Durable Cutlery in use.

Wood's Celebrated Shoe Knives. Butcher

Knives a specialty.

WOODS CUTLERY CO., Antrim, N. H.

CLARK WILSON & CO., Agents, 81 Beckman St., N. Y.

ROMER & CO. MANUF'RS. OF PAD LOCKS

1415 Railroad, NEWARK, N. J.

Established 1857.

Manufacturers of Patent Brass Pad Locks for

Railroads and Switches. Also, Patent Sta-

tionary R. R. Car Door Locks. Patent Plan-

and Sewing Machine Locks.

141 to 145 Railroad Avenue, NEWARK, N. J.

Illustrated Catalogues sent on application.

Send for Circular.

My Blades are forged from the best Cast Steel, and

warranted. To me was awarded the GOLD MEDAL of

the Connecticut State Agricultural Society; also a medal

and Diploma from the Mass. Mechanics' Ass'n Sept. 1860.

Illustrated Catalogues sent on application.

Cutlery.**How Cheaply can Iron be Made in the United States?**

To the Editor of The Iron Age: More than half the entire number of blast furnaces in the country are out of blast. Of those in blast it is safe to say that some are not running at a profit, while very few are earning adequate interest on their investments. This is said to be owing to the low price of iron, and this again to the slack demand, which again resolves itself into a question of demand and supply. Cheap iron makes increased consumption. What is wanted is the ability to produce all the iron which may be called for at just a notch cheaper than any other nation can furnish it to us; and to yield at the same time a reasonable income upon the capital embarked.

How low, then, can pig iron be made in this country, at a profit? We remember seeing statements, made some time before the war, that iron could be made for \$12 per ton. That may have been possible with the low prices for labor then prevailing in favored places; but the current rate for pig iron in our chief markets shows that something over \$20 per ton would be nearer the mark now. At a later date we saw it stated that the materials for a ton of iron could be brought together for about \$10, in the Kanawha Valley, and allowing \$5 per ton for the labor, &c., would leave \$15 as the cost, including the cost of repairs and interest on the capital.

Prof. Anstead, of London; Howell Fisher, of Pottsville; Cyrus Mendenhall, of Cincinnati, and Prof. Ridgway, of Boston, gave their predictions that, in consequence of the richness of the coal seams of the Kanawha, their accessibility, and their nearness to good ore beds, as well as their general relation to water-power, produce fields and the Western iron markets, iron would be made in the Kanawha Valley as cheaply as in any other portion of the country. The first blast furnace erected in the valley was begun soon after the opening of the railroad across the coal field, but its completion was somewhat delayed by the panic of 1873 and the stagnation in trade which followed. Late last autumn, however, it was started in blast. It is situated at Quinton station, on the Chesapeake and Ohio Railroad, about 300 miles from Richmond and 100 miles from the Ohio River. The ores used are drawn from the massive cliffs on the head waters of the James, at Clifton Forge, 125 miles further east, while the coal is drawn from the hills overlooking the furnace. The small coal and waste is first coked, for which it is very suitable; and the limestone is hauled from the Greenbrier Valley, 50 miles distant. The site of the furnace is convenient to coal and water-power; ores can be had from East or West, but it differs in important respects from hundreds of other situations with similar or even better facilities on the line of the same road.

The following is a correct transcript of a week's run, vouches for by the superintendent, General St. John, and an eminent banker of New York City, who has recently given the property his personal inspection, with the additional remark that the week's business is not noticeable either for the quantity of metal turned out or for the gross proceeds credited against it:

QUINNIMONT FURNACE, WEEK ENDING APRIL 17, 1873.

To 274 1/4 tons coke (native) at \$2.25.....	\$517.00
To 428 1/4 tons ore (Virginia) at \$3.90.....	1,671.15
To 241 tons lime (Greenbrier) at \$1.60.....	385.60
Lab'r.....	436.00
Incidentals.....	92.00
Total.....	\$3,212.50
Cr.	
By 86 tons No. 1 toundry at \$24.....	\$2,064.00
By 48 tons No. 2 foundry at \$22.....	1,056.00
By 23 tons No. 1 mill at \$21.....	483.00
By 27 tons No. 2 mill at \$20.....	540.00
Net earnings.....	\$4,143.00

The proportion of the better grades of iron is rather larger than usual, though the aggregate make is less. The coke and ore are charged at the same rates as they are sold to other consumers, while the lime is charged at cost. No charge need be added, therefore, for royalty or interest on lands. The iron is credited at the net product after paying freights to Richmond, Pittsburgh or Cincinnati, where it is consumed, say \$5 to \$7 per ton.

It is alleged that the six months' run, notwithstanding all the delays and inconveniences of pioneering the work, will show a similar result to the week above specified. If these facts can be relied upon, we have the important fact that iron can be, and is being, made in the Kanawha Valley at a cost of \$17.50 per ton of No. 1 varieties, and that the average profit, at the present depressed prices, must exceed over \$5 per ton. The furnace and works are understood to have cost over \$150,000; and on the above showing are yielding over \$50,000 yearly. But, suppose an allowance of \$5000 be made for repairs, relining of furnace and deterioration of buildings, we still have a profit of over 30 per cent. in iron making at this one spot, which is doing pretty well for these times! Is there any locality in the United States which can make a better exhibit?

ASLINE WARD,
101 and 103 Duane Street, N. Y.
REPRESENTING
GEO. WOSTENHOLM & SON,
CUTLERY AND RAZORS,
Washington Works, Sheffield.
CORPORATE MARK.

FREDERICK WARD & CO., Sheffield,
Cutlery and Table Knives.
CORPORATE MARK.

B4*ANY

FURNESS, BANNISTER & CO.
Manufacturers of
Fine Table CUTLERY.
Cor. Nassau & Sheffield Sts.,
NEWARK, N. J.

BACKUS BROTHERS,
Manufacturers of
The Backus Water Motor.
Cor. Wright St. and Ave. A,
Bet. Chestnut St. & S. Broad St. Depots, Newark, N. J.

What They will do.

These Motors are adapted to running light machinery, such as Coffee Mills, Printing Presses, Drug Mills, Church Organs, Bausage Cutters, Ice Cream Freezers, Etc. Hoisting Machines and everything similar to those cities or towns where there are Water Works.

And the best "Motor" in the world for family sewing machines. Send for Circular.

DRAW CUT*
BUTCHERS' MACHINES.
Choppers, Hand and Power
Stuffers, Lard Presses.

Warranted thoroughly made and the Best in Use.
MURRAY IRON WORKS,
Burlington, Iowa.

Centennial Bell and Clock for Independence Hall, Philadelphia.—Henry Seybert, a very patriotic and public spirited citizen of Philadelphia, has made an offer to that city of a very heavy bell and a large clock for use in the tower of old Independence Hall. The bell is to be of Troy manufacture, and, according to contract made with Meneely & Kimberly, is to weigh 13,000 pounds—each 1000 pounds representing one of the original 13 States. Like the old "Liberty Bell," now broken, this bell will bear the inscription, "Proclaim liberty throughout all the land, unto all the inhabitants thereof," as also another scriptural text, "Glory to God in the highest, and on earth peace, good will toward men." The bell is to be placed in the tower prior to the Centennial anniversary, July 4th, 1876.

The Etna Iron Works.

Mr. John J. Schrack sends the following to the Secretary of the Iron and Steel Association, under date of April 10th:

Having never visited the famous Hanging Rock iron region of Ohio, and desirous of seeing the blast furnaces now in process of erection by the Etna Iron Works, at Ironton, I took a trip there last week, and was well repaid for my time and trouble. A brief description of these furnaces, whose erection indicates a new departure in the manufacture of iron in America, will not be uninteresting to iron masters throughout the country.

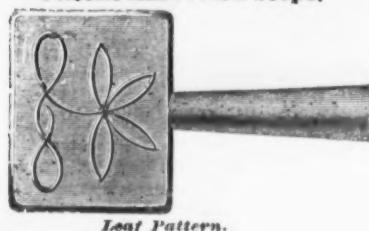
The Etna Iron Works was organized in January, 1873, with George Willard, president, and with a capital stock of \$1,000,000, of which \$350,000 embraced two charcoal furnaces and 20,000 acres of developed ore lands. At the time of the organization of the company it was proposed to build one furnace of the ordinary type of Ohio Valley furnaces. At the request of Mr. Willard, Mr. James P. Witherow, a furnace builder of advanced thought and scientific attainments, visited Ironton, and seeing the Hanging Rock district, of which Ironton is the center, was destined from its mineral wealth to take a leading part in the future iron developments of the West, and ascertaining that the company wished to work its native coal without the admixture of Pittsburgh coke, proposed three different types of furnaces: first, for working Western fuels alone, he recommended a furnace not over 40 feet high, with some modern exterior improvements; second, a furnace 60 feet high for part coal and part coke; and third, he recommended them to take a new departure and place themselves squarely in the advance of iron making in the United States by building a plant of self-cooking furnaces, the invention of Wm. Perry, of the Monkland Iron Works, Scotland, supported by the Whitewell hot blast stoves, of Stockton-on-Tees, England. He had no hope that the latter suggestion would be adopted. The result of his investigations in St. Louis and elsewhere had convinced him that the iron development of the West had produced no positive results, so far as the mastery of the fuel was concerned, as all the furnaces were sending to Pittsburgh for coke. During a visit to the iron regions of Europe he became satisfied that the self-cooking system supported by super-heated air was the real plan of making furnaces profitable. During 1873 these ideas were presented to leading iron men of various iron districts in this country, none of whom would give them any consideration, regarding them as the dreams of an enthusiast. To George Willard, president, and the directors of Etna Iron Works is due the credit of taking a step far in advance of the ordinary manner of making iron at a cost of \$500,000. The company agreed to adopt the ideas if a commission sent to England should report favorably. The commission was sent with Mr. Witherow, and on their return, the report being favorable, the board of directors unanimously resolved to adopt the suggestion, and the building of the furnaces commenced just two weeks before the great financial panic in 1873.

Notwithstanding the panic, and the fact that a large majority of the stockholders were in favor of suspension of operations, work was pushed steadily on, until the enterprise is now near completion.

The work consists of a plant of self-cooking furnaces, 87 feet 6 inches high, 27 feet 6 inches diameter of easing, and 18 feet 6 inches in diameter of boshes. Each furnace has four Whitewell hot-blast stoves with a heating surface of over 50,000 square feet, the temperature of the blast to be sustained from 1400 to 1600 degrees. The chimney is 195 feet high and 9 feet in the clear, this height being necessary to create a draft for the thorough combustion or oxidation of gas in the stoves. There will be 12 cylindrical boilers in three batteries, each boiler 64 feet long. In the engine house, which is covered by iron water tanks, there will be five vertical engines of the most approved pattern. The steam hoist tower, which is built of iron columns, will be operated by two engines, each being separate and independent of the other. The stock house will contain bins having a capacity of 10,000 tons. In the stock house there will be constructed four calcining kilns, each 40 feet high, with 35 feet boshes. As the ore comes from the company's mines, by its own narrow gauge road, the 6 ton cars will be hoisted and lowered by friction pulleys, and the

H. D. SMITH & CO., PLANTSVILLE, CONN.

Patent Embossed Steps.



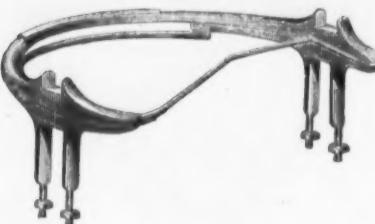
Leaf Pattern.



Established 1850.

1871 Pattern Shaft Couplings.

No. 6 Fifth Wheels.



Patent Cross Bar Steps.



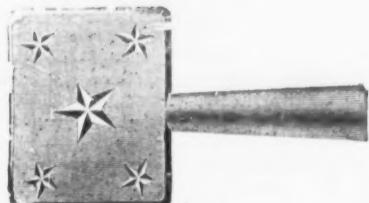
Upper View.

Lower View.

Solid Plain Pattern Steps.



Smith's Improved Philadelphia Pattern Sat Irons.



Star Pattern.

MANUFACTURERS OF A LARGE VARIETY OF FIRST-CLASS

FORGED CARRIAGE IRONS.

Send for Price List.

FORT PLAIN SPRING & AXLE WORKS CLARK, SMITH & CO.,

Green Jacket Axles. FORT PLAIN, N. Y. Fine Carriage Springs.



Manufacturers of English and Swedes Steel Springs, and Iron and Steel Axles.

Execute orders promptly for

Black, Bright, Tempered and Oil Tempered Springs,
of any Pattern or Style. Also for AXLES of any description, from a COMMON LOOSE
COLLAR to the FINEST OF STEEL.Our facilities for manufacturing are very extensive, and with our recent additions of new and improved
Machinery, we defy competition.

Send for Price List and Descriptive Circular.

CARRIAGE BOLTS.

Buy the Best.

Clark's Patent
Carriage Bolt.Best Bolt manufactured for all kinds of agricultural machinery. Will not split the wood, and can not
turn in its place.

MANUFACTURED BY

CLARK BROS. & CO., Milldale, Conn.

Also Manufacturers of

Plow and Machine Bolts, Coach Screws, Nuts, Washers, Tire Blanks, Rivets, &c.
Send for Illustrated Price List

WILSON MANUFACTURING COMPANY., NEW LONDON, CONN.

MANUFACTURER OF

SOLID BOX VISES.

With or without Convex and Concave Washers.

Jackscrews, Braces, Coffe Mills, Turning Lathes, Clamp Heads and Screws, Parallel Bench Vises, Sash Pulleys, Ho House Pulleys, Composition Cocks, Bench Screws, Vice Screws Gridirons, Drill Stocks and Bows, Box Chisels, Rivets, Sheaves, Block Pins, Composition Roller and Iron Bushings, Riggers' Screws, Caulkers' Tools, Pump Chambers, Belaying Pins, Marlin Spikes, Malleable Iron Castings, and General Hardware.

GALVANIZING DONE TO ORDER.

WILSON MFG. COMPANY,

Warehouse, 97 Chambers and 81 Reade Streets, N. Y.

HOOPES & TOWNSEND,

Manufacturers of

MACHINE & CAR BOLTS, Cold Punched Square & Hexagon Nuts,

Washers, Rivets, Wood or Lag Screws. Chain Links, Truck and Car Forgings, Bridge Bolts, Bridge Forgings.

IRONS AND RODS FOR BUILDINGS.

1330 Buttonwood Street.

PHILADELPHIA.

Philadelphia Star Bolt Works.

"STAR"

Carriage and Tire Bolts,

From the Best Brands

of

NORWAY IRON.



"STAR" Axle Clip.

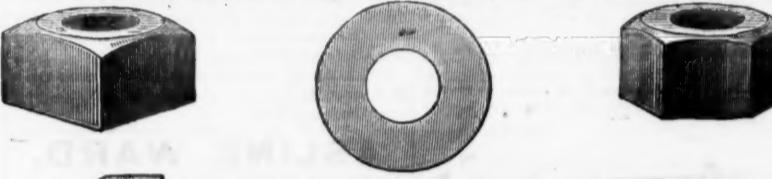
All Styles of

FANCY HEAD BOLTS.

Blank Bolts, Skein Bolts, Square Head Bolts, Plow Bolts, &c., &c., &c.

TOWNSEND, WILSON & HUBBARD, 2301 Cherry St., Philadelphia, Pa

Old Colony Rivet Works.



Rivets, Nuts, Washers, Lag Screws, Coleman's Eagle Carriage and Tire Bolts, Axle Clips, Feloe Plates, Shaft Couplings, Stove and Machine Bolts, Drilling Machines, Tire Benders, &c. Full stock constantly on hand.

Warehouse, 34 Warren St., N. Y.



STEPHENS & CO.,

Manufacturers of

U.S. Standard Boxwood and Ivory RULES.

Also Exclusive Manufacturers of

L. C. STEPHENS' PATENT COMBINATION

RULE.

Riverton, Conn.

Boxwood and Ivory Rules having been our specialty for over twenty years, we guarantee the uniform excellence which has always characterized our goods.

Price Lists on application.

**ARMS, BELL & CO.,**

Manufacturers of

Carriage, Tire & Square Head Bolts.

Cold Pressed Nuts and Washers, Etc., YOUNGSTOWN, OHIO.

Price lists sent on application.



Patented July 9th, 1872.



PATENT IMPROVED STEAM TRAP

The only self-regulating Steam Trap in the world.

For full description send for circular to

A. L. JONES,

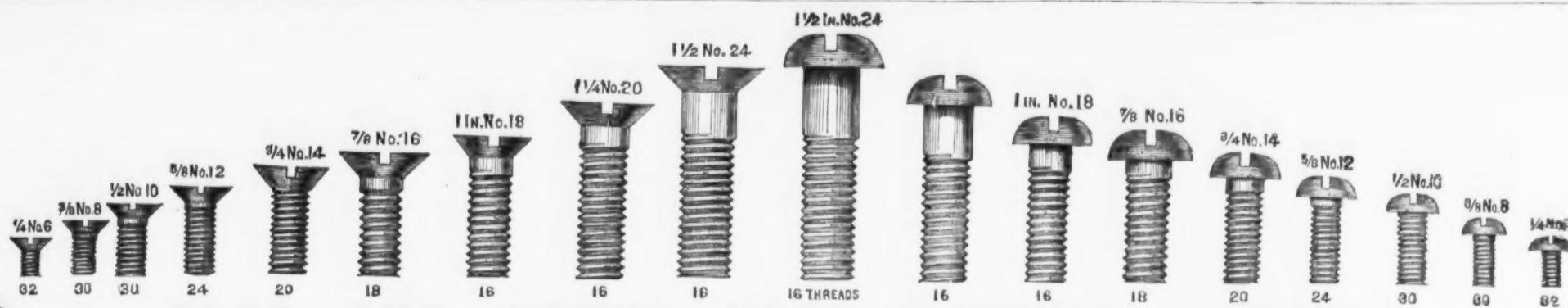
Steam Heating Establishment, 51 S. 4th street, Phila.



FRANKLIN S. MILES,
Manufacturer of
Brass, Iron, Steel and German Silver
SCREWS.
205 Quarry Street, Philadelphia.

Alexander Brothers,
Manufacturers of OAK TANNED
LeatherBelting
410 & 412 North 3d, Philadelphia, Pa.

Faught's Patent
ROUND BRAIDED
Belting.
THE BEST THING OUT.
Manufactured only by
C. W. ARNY,
301 Cherry St., Philadelphia.
Send for Circular.



FLAT AND ROUND HEAD MACHINE SCREWS,

OF SIZES, Nos. - - 4, 6, 8, 10, 12, 14, 16, 18, 20, 24, SCREW GAUGE.
AND LENGTHS - - $\frac{1}{4}$, $\frac{3}{8}$, $\frac{1}{2}$, $\frac{5}{8}$, $\frac{3}{4}$, 1, $\frac{1}{4}$, $1\frac{1}{2}$ INCH.

PLUG AND BOTTOMING TAPS.

Manufactured, KEPT IN STOCK, and sold by

AMERICAN SCREW COMPANY, - - PROVIDENCE, R. I.

Fillister Head and Pattern Machine Screws Made to Order Promptly.

11 Warren Street, N. Y.

H. B. NEWHALL,
Agent for the Following Companies:

EMMET HAMMER CO.,

Manufacturers of all kinds of

Hammers and Sledges and Contractors' Tools.

H. B. NEWHALL, Agent.

All our goods are branded "E. F. EMMET & CO., Brooklyn, N. Y."
None genuine without the above brand.



MACHINIST Ball, Straight and Cross Peen Hammers.
BLACKSMITH, Hand and Riveting Hammers.
" Sledges, Swages, Fullers, Flatters, hot and cold
Chisels.

HORSE SHOERS' Turning and Shoeing Hammers, Sledges, Pincers, Pliers.

MINERS' Striking and Drilling Hammers.

QUARRY Sledges, Macadamizing Hammers.

MASSONS' Hammers, Brick Hammers.

BOILERMAKERS' Riveting and Flogging Hammers.

COOPERS' Hammers, Drivers and Stakes.

RAILROAD and SHIP SPIKE Mauls, &c., &c.

All kinds of

ANVIL TOOLS and STEEL FORGINGS

Made to order at short notice.



WM. H. HASKELL & CO.,
Pawtucket, R. I.

Manufacturers of

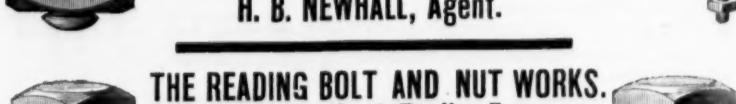
COACH SCREWS (with Gimlet Point),

all kinds of

Machine and Plow Bolts,

FORGED SET SCREWS AND TAP BOLTS.

H. B. NEWHALL, Agent.



THE READING BOLT AND NUT WORKS.

J. H. Sternbergh, Reading, Pa.

Manufacturer of

MACHINE BOLTS.

Bridge,

Roof,

and

Car Bolts.

Hot Pressed Nuts,

Washers, Wood or Lag Screws, Refined Bar Iron, &c.

H. B. NEWHALL, Agent, 11 Warren St., N. Y.

S. H. & E. Y. MOORE, Agents, 68 Lake St., Chicago, Ill.

POST & CO., Agents, Cincinnati, Ohio.

Penfield Block Works,

LOCKPORT, N. Y.

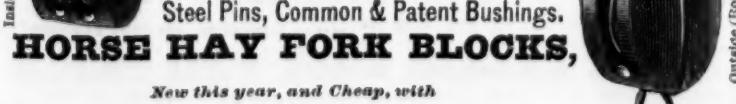
Manufacturers of

The "ANCHOR" Brand of

TACKLE BLOCKS,

Rope and Iron Straps,

Steel Pins, Common & Patent Bushings.



New this year, and Cheap, with

OUTSIDE (ROUND) IRON STRAPS.

AMERICAN BOLT COMPANY,

MANUFACTURE

BOLTS AND NUTS.

Coach or Lag Screws, Washers, Chain Links, Forgings, &c.
OF ALL KINDS AND SIZES, AT SHORT NOTICE.

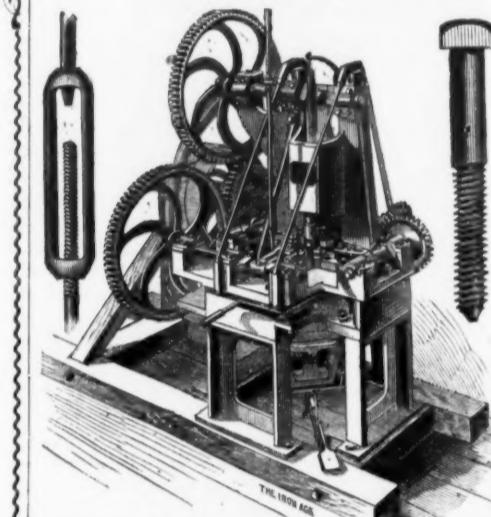
210 Lawrence St., Lowell, Mass.

JONATHAN HOPE.

With increased facilities we are now enabled to pay prompt attention to all orders for our Patent Bolt Heading Machine, now fully acknowledged the best ever invented. Our Machines will head Bolts from $\frac{1}{4}$ inch diameter to $1\frac{1}{2}$ inches, and from $\frac{1}{8}$ inch to 48 inches long, or longer if necessary, changing, with head from $\frac{1}{4}$ inch to $1\frac{1}{2}$ inches, head, &c., and properly attended, without changing, will head from 4000 to 5000 per day. We also produce our Patent Bolt Cutter, which will cut Bolts from $\frac{3}{8}$ inch diameter to $1\frac{1}{2}$ inches inclusive. A boy will cut on an average 1000 $\frac{1}{8}$ inch Bolts per day. Parties wishing first class Bolt Heading Machines or Bolt Cutters, we would respectfully call their attention to them when they can at all times see the Machines in operation and judge for themselves. Perfect satisfaction guaranteed in all cases. For further information apply to the American Bolt Co., Lowell, Mass.

ROBERT H. BUTCHER.

JAMES MINTED



AMERICAN BOLT COMPANY,

MANUFACTURE

BOLTS AND NUTS.

Coach or Lag Screws, Washers, Chain Links, Forgings, &c.

OF ALL KINDS AND SIZES, AT SHORT NOTICE.

210 Lawrence St., Lowell, Mass.

JONATHAN HOPE.

With increased facilities we are now enabled to pay prompt attention to all orders for our Patent Bolt Heading Machine, now fully acknowledged the best ever invented. Our Machines will head Bolts from $\frac{1}{4}$ inch diameter to $1\frac{1}{2}$ inches, and from $\frac{1}{8}$ inch to 48 inches long, or longer if necessary, changing, with head from $\frac{1}{4}$ inch to $1\frac{1}{2}$ inches, head, &c., and properly attended, without changing, will head from 4000 to 5000 per day. We also produce our Patent Bolt Cutter, which will cut Bolts from $\frac{3}{8}$ inch diameter to $1\frac{1}{2}$ inches inclusive. A boy will cut on an average 1000 $\frac{1}{8}$ inch Bolts per day. Parties wishing first class Bolt Heading Machines or Bolt Cutters, we would respectfully call their attention to them when they can at all times see the Machines in operation and judge for themselves. Perfect satisfaction guaranteed in all cases. For further information apply to the American Bolt Co., Lowell, Mass.

ROBERT H. BUTCHER.

JAMES MINTED

With increased facilities we are now enabled to pay prompt attention to all orders for our Patent Bolt Heading Machine, now fully acknowledged the best ever invented. Our Machines will head Bolts from $\frac{1}{4}$ inch diameter to $1\frac{1}{2}$ inches, and from $\frac{1}{8}$ inch to 48 inches long, or longer if necessary, changing, with head from $\frac{1}{4}$ inch to $1\frac{1}{2}$ inches, head, &c., and properly attended, without changing, will head from 4000 to 5000 per day. We also produce our Patent Bolt Cutter, which will cut Bolts from $\frac{3}{8}$ inch diameter to $1\frac{1}{2}$ inches inclusive. A boy will cut on an average 1000 $\frac{1}{8}$ inch Bolts per day. Parties wishing first class Bolt Heading Machines or Bolt Cutters, we would respectfully call their attention to them when they can at all times see the Machines in operation and judge for themselves. Perfect satisfaction guaranteed in all cases. For further information apply to the American Bolt Co., Lowell, Mass.

210 Lawrence St., Lowell, Mass.

JONATHAN HOPE.

With increased facilities we are now enabled to pay prompt attention to all orders for our Patent Bolt Heading Machine, now fully acknowledged the best ever invented. Our Machines will head Bolts from $\frac{1}{4}$ inch diameter to $1\frac{1}{2}$ inches, and from $\frac{1}{8}$ inch to 48 inches long, or longer if necessary, changing, with head from $\frac{1}{4}$ inch to $1\frac{1}{2}$ inches, head, &c., and properly attended, without changing, will head from 4000 to 5000 per day. We also produce our Patent Bolt Cutter, which will cut Bolts from $\frac{3}{8}$ inch diameter to $1\frac{1}{2}$ inches inclusive. A boy will cut on an average 1000 $\frac{1}{8}$ inch Bolts per day. Parties wishing first class Bolt Heading Machines or Bolt Cutters, we would respectfully call their attention to them when they can at all times see the Machines in operation and judge for themselves. Perfect satisfaction guaranteed in all cases. For further information apply to the American Bolt Co., Lowell, Mass.

210 Lawrence St., Lowell, Mass.

JONATHAN HOPE.

With increased facilities we are now enabled to pay prompt attention to all orders for our Patent Bolt Heading Machine, now fully acknowledged the best ever invented. Our Machines will head Bolts from $\frac{1}{4}$ inch diameter to $1\frac{1}{2}$ inches, and from $\frac{1}{8}$ inch to 48 inches long, or longer if necessary, changing, with head from $\frac{1}{4}$ inch to $1\frac{1}{2}$ inches, head, &c., and properly attended, without changing, will head from 4000 to 5000 per day. We also produce our Patent Bolt Cutter, which will cut Bolts from $\frac{3}{8}$ inch diameter to $1\frac{1}{2}$ inches inclusive. A boy will cut on an average 1000 $\frac{1}{8}$ inch Bolts per day. Parties wishing first class Bolt Heading Machines or Bolt Cutters, we would respectfully call their attention to them when they can at all times see the Machines in operation and judge for themselves. Perfect satisfaction guaranteed in all cases. For further information apply to the American Bolt Co., Lowell, Mass.

210 Lawrence St., Lowell, Mass.

JONATHAN HOPE.

With increased facilities we are now enabled to pay prompt attention to all orders for our Patent Bolt Heading Machine, now fully acknowledged the best ever invented. Our Machines will head Bolts from $\frac{1}{4}$ inch diameter to $1\frac{1}{2}$ inches, and from $\frac{1}{8}$ inch to 48 inches long, or longer if necessary, changing, with head from $\frac{1}{4}$ inch to $1\frac{1}{2}$ inches, head, &c., and properly attended, without changing, will head from 4000 to 5000 per day. We also produce our Patent Bolt Cutter, which will cut Bolts from $\frac{3}{8}$ inch diameter to $1\frac{1}{2}$ inches inclusive. A boy will cut on an average 1000 $\frac{1}{8}$ inch Bolts per day. Parties wishing first class Bolt Heading Machines or Bolt Cutters, we would respectfully call their attention to them when they can at all times see the Machines in operation and judge for themselves. Perfect satisfaction guaranteed in all cases. For further information apply to the American Bolt Co., Lowell, Mass.

210 Lawrence St., Lowell, Mass.

JONATHAN HOPE.

With increased facilities we are now enabled to pay prompt attention to all orders for our Patent Bolt Heading Machine, now fully acknowledged the best ever invented. Our Machines will head Bolts from $\frac{1}{4}$ inch diameter to $1\frac{1}{2}$ inches, and from $\frac{1}{8}$ inch to 48 inches long, or longer if necessary, changing, with head from $\frac{1}{4}$ inch to $1\frac{1}{2}$ inches, head, &c., and properly attended, without changing, will head from 4000 to 5000 per day. We also produce our Patent Bolt Cutter, which will cut Bolts from $\frac{3}{8}$ inch diameter to $1\frac{1}{2}$ inches inclusive. A boy will cut on an average 1000 $\frac{1}{8}$ inch Bolts per day. Parties wishing first class Bolt Heading Machines or Bolt Cutters, we would respectfully call their attention to them when they can at all times see the Machines in operation and judge for themselves. Perfect satisfaction guaranteed in all cases. For further information apply to the American Bolt Co., Lowell, Mass.

210 Lawrence St., Lowell, Mass.

JONATHAN HOPE.

With increased facilities we are now enabled to pay prompt attention to all orders for our Patent Bolt Heading Machine, now fully acknowledged the best ever invented. Our Machines will head Bolts from $\frac{1}{4}$ inch diameter to $1\frac{1}{2}$ inches, and from $\frac{1}{8}$ inch to 48 inches long, or longer if necessary, changing, with head from $\frac{1}{4}$ inch to $1\frac{1}{2}$ inches, head, &c., and properly attended, without changing, will head from 4000 to 5000 per day. We also produce our Patent Bolt Cutter, which will cut Bolts from $\frac{3}{8}$ inch diameter to $1\frac{1}{2}$ inches inclusive. A boy will cut on an average 1000 $\frac{1}{8}$ inch Bolts per day. Parties wishing first class Bolt Heading Machines or Bolt Cutters, we would respectfully call their attention to them when they can at all times see the Machines in operation and judge for themselves. Perfect satisfaction guaranteed in all cases. For further information apply to the American Bolt Co., Lowell, Mass.

210 Lawrence St., Lowell, Mass.

JONATHAN HOPE.

With increased facilities we are now enabled to pay prompt attention to all orders for our Patent Bolt Heading Machine, now fully acknowledged the best ever invented. Our Machines will head Bolts from $\frac{1}{4}$ inch diameter to $1\frac{1}{2}$ inches, and from $\frac{1}{8}$ inch to 48 inches long, or longer if necessary, changing, with head from $\frac{1}{4}$ inch to $1\frac{1}{2}$ inches, head, &c., and properly attended, without changing, will head from 4000 to 5000 per day. We also produce our Patent Bolt Cutter, which will cut Bolts from $\frac{3}{8}$ inch diameter to $1\frac{1}{2}$ inches inclusive. A boy will cut on an average 1000 $\frac{1}{8}$ inch Bolts per day. Parties wishing first class Bolt Heading Machines or Bolt Cutters, we would respectfully call their attention to them when they can at all times see the Machines in operation and judge for themselves. Perfect satisfaction guaranteed in all cases. For further information apply to the American Bolt Co., Lowell, Mass.

210 Lawrence St., Lowell, Mass.

JONATHAN HOPE.

With increased facilities we are now enabled to pay prompt attention to all orders for our Patent Bolt Heading Machine, now fully acknowledged the best ever invented. Our Machines will head Bolts from $\frac{1}{4}$ inch diameter to $1\frac{1}{2}$ inches, and from $\frac{1}{8}$ inch to 48 inches long, or longer if necessary, changing, with head from $\frac{1}{4}$ inch to $1\frac{1}{2}$ inches, head, &c., and properly attended, without changing, will head from 4000 to 5000 per day. We also produce our Patent Bolt Cutter, which will cut Bolts from $\frac{3}{8}$ inch diameter to $1\frac{1}{2}$ inches inclusive. A boy will cut on an average 1000 $\frac{1}{8}$ inch Bolts per day. Parties wishing first class Bolt Heading Machines or Bolt Cutters, we would respectfully call their attention to them when they can at all times see the Machines in operation and judge for themselves. Perfect satisfaction guaranteed in all cases. For further information apply to the American Bolt Co., Lowell, Mass.

210 Lawrence St., Lowell, Mass.

JONATHAN HOPE.

With increased facilities we are now enabled to pay prompt attention to all orders for our Patent Bolt Heading Machine, now fully acknowledged the best ever invented. Our Machines will head Bolts from $\frac{1}{4}$ inch diameter to $1\frac{1}{2}$ inches, and from $\frac{1}{8}$ inch to 48 inches long, or longer if necessary, changing, with head from $\frac{1}{4}$ inch to $1\frac{1}{2}$ inches, head, &c., and properly attended, without changing, will head from 4000 to 5000 per day. We also produce our Patent Bolt Cutter, which will cut Bolts from $\frac{3}{8}$ inch diameter to $1\frac{1}{2}$ inches inclusive. A boy will cut on an average 1000 $\frac{1}{8}$ inch Bolts per day. Parties wishing first class Bolt Heading

The Iron Age.

New York, Thursday, May 20, 1875.

DAVID WILLIAMS - Publisher and Proprietor.
JAMES C. BAYLES - Editor.
JOHN S. KING - Business Manager.

NEW YORK, January 2, 1875.

Until the 1st instant the postage on newspapers was paid by subscribers at the office where the paper was received, the yearly rates on the different editions of *The Iron Age* being as follows: Weekly, 40 cents; Semi-Monthly, 40 cents; Monthly, 24 cents.

Under the provisions of the new postal law, which went into effect on the 1st instant, prepayment at the office of mailing is required, at the rate of two cents per pound for the Weekly, and three cents per pound for the Semi-Monthly and Monthly, which will make the postage as follows on the different editions: Weekly, 50 cents; Semi-Monthly, 30 cents; Monthly, 15 cents.

Our rates of subscription will therefore be as follows:

Weekly Edition.....\$4.50 a year.
Issued every THURSDAY Morning. Contains full Trade Reports for the week, brought up to the close of business on the previous day.

Semi-Monthly Edition.....\$2.30 a year.
Issued the FIRST and THIRD Thursday of every month. Contains a full Review of the Trade for the previous half month.

Monthly Edition.....\$1.15 a year.
Issued the FIRST Thursday of every month. Contains a full Review of the Trade for the previous month.

To Foreign Countries.

	Including Postage.		
	Weekly.	Semi-Monthly.	Monthly.
Canada.....	\$2.50	\$2.30	\$1.15
Great Britain.....	6.00	5.00	5.00
France.....	7.00	5.50	5.75
Germany.....	8.00	4.00	2.00
Prussia.....	8.00	4.00	2.00
Buenos Ayres.....	8.00	4.00	2.00
Peru.....	6.00	5.00	5.00
Belgium.....	8.00	4.00	2.00
Mexico.....	8.00	4.00	2.00
Sweden.....	8.00	4.00	2.00
New Zealand.....	8.00	4.00	2.00
Brazil.....	8.50	4.25	2.13

ADVERTISING.

One square (12 lines, one inch), one insertion, \$2.50; one month, \$7.50; three months, \$15.00; six months, \$35.00; one year, \$40.00; payable in advance.

All communications should be addressed to *

DAVID WILLIAMS, Publisher,
10 Warren Street, New York.

EUROPEAN AGENCY.

CHARLES CHURCHILL & CO., American Merchants, 28 Wilson Street, Finsbury, London, England, will receive subscriptions (all postage prepaid by us) at the following prices in sterling: Great Britain and France, 25.; Germany, Prussia and Belgium, 35.4.; Sweden, 30. They will also accept orders for advertisements, for which they will give prices on application.

Clv Subscribers will confer a favor upon the Publisher, by reporting at this office any delinquency on the part of carriers in delivering *The Iron Age*; also the loss of any papers for which the carriers are responsible. Our carriers are selected dealers, and are to be deemed authorized to receive them and not to throw them in half ways or upon stairs; and it is our desire and intention to enforce this rule in every instance.

CONTENTS.

First Page.—Gear Cutting Attachment for Lathes. The Law of Trade-Marks and Their Protection. Manufacturers of American Tin Plates. Mosaic Iron.

Third Page.—Iron Making in the South. Fifth Page—New Patents. Rolling Forty-Eight Feet Rails Charcoal Iron for the English Market.

Seventh Page.—The Early History of the English Coal and Navigation Company.

Ninth Page.—Business Hours. Ice Manufacture.

Eleventh Page.—How Cheaply Can Iron be Made in the United States? Centennial Bell and Clock for Independence Hall, Philadelphia. The Etna Iron Works.

Fourteenth Page.—Tin Plates and Stamped Goods. English Stoves. The Recent Improvement in Domestic Spelter. The Iron and Steel Institute of Great Britain.

Fifteenth Page.—The Iron and Steel Institute of Great Britain. (Concluded). New Publications. Scientific and Technical Notes.

Sixteenth Page.—Heating with Steam and Hot Water.

Seventeenth Page.—Liabilities of Consolidated Companies for Obligations of the Old Ones. What Cheap Electricity is Expected to Do. Comparative Cost of English and American Bessemer Steel.

Twenty-first Page.—Trade Report.

Twenty-second Page.—Trade Report. (continued). Our English Letter.

Twenty-third Page.—Our English Letter. (Concluded). Some Recent Developments in the Technology of Iron.

Twenty-fourth Page.—The London Metal Market.

Twenty-seventh Page.—The Iron Age Director.

Twenty-eighth Page.—Portable Water Wheels.

Mine Drilling.

Thirtieth Page.—New York Wholesale Prices of Hardware and Metals.

Thirty-first Page.—New York Wholesale Prices. (concluded).

Thirty-fifth Page.—Philadelphia, Buffalo, Cincinnati, Pittsburgh and Detroit Hardware and Metal Prices.

Thirty-seventh Page.—Chicago, Boston, and St. Louis—Hardware and Metal Prices.

Tin Plates and Stamped Goods.

The British *Trade Journal* accuses *The Iron Age* of attributing to it some remarks concerning American sheet metal goods in the English market, which it denies having printed. With characteristic good taste it says:

Whether such an article ever appeared in any English publication, and in the course of the scissors operations of the editor has been by mistake attributed to us, we will not undertake to determine. But the singular circumstance of the name of this journal having been given as the authority for any piece of information whatever inclines us to the belief that the alleged article is only a playful American fiction which it was judged necessary to label with the name of a respectable journal to give it currency. We refrain from giving to this puff the currency of our circulation by quoting it at length. But it is proper that we should admit that American stampings are generally better than English, but not better than French. No tin plates, however, are made in the States, and the tin plates stampings produced in America are made from tin plates exported from this country. Very good sheets are made in the States, but not better than those made in England, and the

deep stampings referred to in the puff have been for the most part made from English sheets exported to New York through Liverpool. Thin iron, such as that used for photographs, has been regularly made in this country as a commercial article for the last thirty years. At present it is unnecessary to say more on this subject, and a sense of duty has made it incumbent upon us not to have said less.

To this we reply as follows:

1. The quotation printed by us was cut from an English paper, and we believe from the *Trade Journal*; at all events, credit was given it in good faith, and we still believe that the editor of the *Trade Journal* will find it if he will search his file.

2d. We do not consider the *Trade Journal* any more "respectable" than any one of twenty English papers, and it is not, so far as we know, considered in this country an authority on any subject.

3d. Tin plates are made in this country which, for the manufacture of large stamped goods, are better than any of British manufacture which have ever come to the United States. Certain classes of articles are stamped from American tin plates which could not be made from any plates of foreign manufacture which are known in this country. We know of one large establishment in this city which uses American tinned iron exclusively in the manufacture of an extensive line of superior goods, and will not again use any foreign plates for any purpose, except small regular sizes.

4th. In the manufacture of stamped goods we are probably as far ahead of France as France is ahead of England. There is at least one house in this city producing stamped goods from tin plates, and from sheet iron to be tinned after stamping, which for excellence of shape, material and finish, can safely challenge the world; and there are many in this and neighboring cities whose products are vastly better than any stamped sheet metal goods ever brought into the United States from abroad. These goods are largely made from English plates, but the fact that they can be profitably exported in very large quantities after being manufactured here, and to markets in which they compete with English, French and German goods, may be accepted as a very fair test of their excellence.

To show what our American manufacturers can do in the way of deep and difficult stamping, we can mention a few pieces which we have seen in stock within the past few days: A pail with vertical sides, 9 inches deep and 13 inches in diameter struck up from a single piece and finished so as not to show a wrinkle. A saucepan-shaped "cooking pot" 7 inches deep, with top and bottom of same size and swelled outward so as to be of greater diameter at center than at top and bottom, struck from single piece of metal. A cylinder 5½ inches in diameter, with a hemispherical head, and 9 inches deep, sides perfectly free from wrinkles, struck from black iron and tinned afterward. This is also struck up from a single piece of sheet metal. A cream pitcher, oval in horizontal and vertical sections, 7 inches high. The diameters at the mouth were respectively 4 inches by 4½. At the largest point below, the long diameter was 6 and the short 5½ inches. This was from the regular stock, stamped from a single piece of black iron and tinned afterward. Of the ordinary work of pans from 8 to 11 inches deep and of large diameters, we might mention many other equally remarkable articles, but it is safe to say that in no other country of the world could those which we have described be made by stamping. This is also struck up from a single piece of sheet metal. A cream pitcher, oval in horizontal and vertical sections, 7 inches high. The diameters at the mouth were respectively 4 inches by 4½. At the largest point below, the long diameter was 6 and the short 5½ inches. This was from the regular stock, stamped from a single piece of black iron and tinned afterward. Of the ordinary work of pans from 8 to 11 inches deep and of large diameters, we might mention many other equally remarkable articles, but it is safe to say that in no other country of the world could those which we have described be made by stamping. This is also struck up from a single piece of sheet metal. A cream pitcher, oval in horizontal and vertical sections, 7 inches high. The diameters at the mouth were respectively 4 inches by 4½. At the largest point below, the long diameter was 6 and the short 5½ inches. This was from the regular stock, stamped from a single piece of black iron and tinned afterward. Of the ordinary work of pans from 8 to 11 inches deep and of large diameters, we might mention many other equally remarkable articles, but it is safe to say that in no other country of the world could those which we have described be made by stamping. This is also struck up from a single piece of sheet metal. A cream pitcher, oval in horizontal and vertical sections, 7 inches high. The diameters at the mouth were respectively 4 inches by 4½. At the largest point below, the long diameter was 6 and the short 5½ inches. This was from the regular stock, stamped from a single piece of black iron and tinned afterward. Of the ordinary work of pans from 8 to 11 inches deep and of large diameters, we might mention many other equally remarkable articles, but it is safe to say that in no other country of the world could those which we have described be made by stamping. This is also struck up from a single piece of sheet metal. A cream pitcher, oval in horizontal and vertical sections, 7 inches high. The diameters at the mouth were respectively 4 inches by 4½. At the largest point below, the long diameter was 6 and the short 5½ inches. This was from the regular stock, stamped from a single piece of black iron and tinned afterward. Of the ordinary work of pans from 8 to 11 inches deep and of large diameters, we might mention many other equally remarkable articles, but it is safe to say that in no other country of the world could those which we have described be made by stamping. This is also struck up from a single piece of sheet metal. A cream pitcher, oval in horizontal and vertical sections, 7 inches high. The diameters at the mouth were respectively 4 inches by 4½. At the largest point below, the long diameter was 6 and the short 5½ inches. This was from the regular stock, stamped from a single piece of black iron and tinned afterward. Of the ordinary work of pans from 8 to 11 inches deep and of large diameters, we might mention many other equally remarkable articles, but it is safe to say that in no other country of the world could those which we have described be made by stamping. This is also struck up from a single piece of sheet metal. A cream pitcher, oval in horizontal and vertical sections, 7 inches high. The diameters at the mouth were respectively 4 inches by 4½. At the largest point below, the long diameter was 6 and the short 5½ inches. This was from the regular stock, stamped from a single piece of black iron and tinned afterward. Of the ordinary work of pans from 8 to 11 inches deep and of large diameters, we might mention many other equally remarkable articles, but it is safe to say that in no other country of the world could those which we have described be made by stamping. This is also struck up from a single piece of sheet metal. A cream pitcher, oval in horizontal and vertical sections, 7 inches high. The diameters at the mouth were respectively 4 inches by 4½. At the largest point below, the long diameter was 6 and the short 5½ inches. This was from the regular stock, stamped from a single piece of black iron and tinned afterward. Of the ordinary work of pans from 8 to 11 inches deep and of large diameters, we might mention many other equally remarkable articles, but it is safe to say that in no other country of the world could those which we have described be made by stamping. This is also struck up from a single piece of sheet metal. A cream pitcher, oval in horizontal and vertical sections, 7 inches high. The diameters at the mouth were respectively 4 inches by 4½. At the largest point below, the long diameter was 6 and the short 5½ inches. This was from the regular stock, stamped from a single piece of black iron and tinned afterward. Of the ordinary work of pans from 8 to 11 inches deep and of large diameters, we might mention many other equally remarkable articles, but it is safe to say that in no other country of the world could those which we have described be made by stamping. This is also struck up from a single piece of sheet metal. A cream pitcher, oval in horizontal and vertical sections, 7 inches high. The diameters at the mouth were respectively 4 inches by 4½. At the largest point below, the long diameter was 6 and the short 5½ inches. This was from the regular stock, stamped from a single piece of black iron and tinned afterward. Of the ordinary work of pans from 8 to 11 inches deep and of large diameters, we might mention many other equally remarkable articles, but it is safe to say that in no other country of the world could those which we have described be made by stamping. This is also struck up from a single piece of sheet metal. A cream pitcher, oval in horizontal and vertical sections, 7 inches high. The diameters at the mouth were respectively 4 inches by 4½. At the largest point below, the long diameter was 6 and the short 5½ inches. This was from the regular stock, stamped from a single piece of black iron and tinned afterward. Of the ordinary work of pans from 8 to 11 inches deep and of large diameters, we might mention many other equally remarkable articles, but it is safe to say that in no other country of the world could those which we have described be made by stamping. This is also struck up from a single piece of sheet metal. A cream pitcher, oval in horizontal and vertical sections, 7 inches high. The diameters at the mouth were respectively 4 inches by 4½. At the largest point below, the long diameter was 6 and the short 5½ inches. This was from the regular stock, stamped from a single piece of black iron and tinned afterward. Of the ordinary work of pans from 8 to 11 inches deep and of large diameters, we might mention many other equally remarkable articles, but it is safe to say that in no other country of the world could those which we have described be made by stamping. This is also struck up from a single piece of sheet metal. A cream pitcher, oval in horizontal and vertical sections, 7 inches high. The diameters at the mouth were respectively 4 inches by 4½. At the largest point below, the long diameter was 6 and the short 5½ inches. This was from the regular stock, stamped from a single piece of black iron and tinned afterward. Of the ordinary work of pans from 8 to 11 inches deep and of large diameters, we might mention many other equally remarkable articles, but it is safe to say that in no other country of the world could those which we have described be made by stamping. This is also struck up from a single piece of sheet metal. A cream pitcher, oval in horizontal and vertical sections, 7 inches high. The diameters at the mouth were respectively 4 inches by 4½. At the largest point below, the long diameter was 6 and the short 5½ inches. This was from the regular stock, stamped from a single piece of black iron and tinned afterward. Of the ordinary work of pans from 8 to 11 inches deep and of large diameters, we might mention many other equally remarkable articles, but it is safe to say that in no other country of the world could those which we have described be made by stamping. This is also struck up from a single piece of sheet metal. A cream pitcher, oval in horizontal and vertical sections, 7 inches high. The diameters at the mouth were respectively 4 inches by 4½. At the largest point below, the long diameter was 6 and the short 5½ inches. This was from the regular stock, stamped from a single piece of black iron and tinned afterward. Of the ordinary work of pans from 8 to 11 inches deep and of large diameters, we might mention many other equally remarkable articles, but it is safe to say that in no other country of the world could those which we have described be made by stamping. This is also struck up from a single piece of sheet metal. A cream pitcher, oval in horizontal and vertical sections, 7 inches high. The diameters at the mouth were respectively 4 inches by 4½. At the largest point below, the long diameter was 6 and the short 5½ inches. This was from the regular stock, stamped from a single piece of black iron and tinned afterward. Of the ordinary work of pans from 8 to 11 inches deep and of large diameters, we might mention many other equally remarkable articles, but it is safe to say that in no other country of the world could those which we have described be made by stamping. This is also struck up from a single piece of sheet metal. A cream pitcher, oval in horizontal and vertical sections, 7 inches high. The diameters at the mouth were respectively 4 inches by 4½. At the largest point below, the long diameter was 6 and the short 5½ inches. This was from the regular stock, stamped from a single piece of black iron and tinned afterward. Of the ordinary work of pans from 8 to 11 inches deep and of large diameters, we might mention many other equally remarkable articles, but it is safe to say that in no other country of the world could those which we have described be made by stamping. This is also struck up from a single piece of sheet metal. A cream pitcher, oval in horizontal and vertical sections, 7 inches high. The diameters at the mouth were respectively 4 inches by 4½. At the largest point below, the long diameter was 6 and the short 5½ inches. This was from the regular stock, stamped from a single piece of black iron and tinned afterward. Of the ordinary work of pans from 8 to 11 inches deep and of large diameters, we might mention many other equally remarkable articles, but it is safe to say that in no other country of the world could those which we have described be made by stamping. This is also struck up from a single piece of sheet metal. A cream pitcher, oval in horizontal and vertical sections, 7 inches high. The diameters at the mouth were respectively 4 inches by 4½. At the largest point below, the long diameter was 6 and the short 5½ inches. This was from the regular stock, stamped from a single piece of black iron and tinned afterward. Of the ordinary work of pans from 8 to 11 inches deep and of large diameters, we might mention many other equally remarkable articles, but it is safe to say that in no other country of the world could those which we have described be made by stamping. This is also struck up from a single piece of sheet metal. A cream pitcher, oval in horizontal and vertical sections, 7 inches high. The diameters at the mouth were respectively 4 inches by 4½. At the largest point below, the long diameter was 6 and the short 5½ inches. This was from the regular stock, stamped from a single piece of black iron and tinned afterward. Of the ordinary work of pans from 8 to 11 inches deep and of large diameters, we might mention many other equally remarkable articles, but it is safe to say that in no other country of the world could those which we have described be made by stamping. This is also struck up from a single piece of sheet metal. A cream pitcher, oval in horizontal and vertical sections, 7 inches high. The diameters at the mouth were respectively 4 inches by 4½. At the largest point below, the long diameter was 6 and the short 5½ inches. This was from the regular stock, stamped from a single piece of black iron and tinned afterward. Of the ordinary work of pans from 8 to 11 inches deep and of large diameters, we might mention many other equally remarkable articles, but it is safe to say that in no other country of the world could those which we have described be made by stamping. This is also struck up from a single piece of sheet metal. A cream pitcher, oval in horizontal and vertical sections, 7 inches high. The diameters at the mouth were respectively 4 inches by 4½. At the largest point below, the long diameter was 6 and the short 5½ inches. This was from the regular stock, stamped from a single piece of black iron and tinned afterward. Of the ordinary work of pans from 8 to 11 inches deep and of large diameters, we might mention many other equally remarkable articles, but it is safe to say that in no other country of the world could those which we have described be made by stamping. This is also struck up from a single piece of sheet metal. A cream pitcher, oval in horizontal and vertical sections, 7 inches high. The diameters at the mouth were respectively 4 inches by 4½. At the largest point below, the long diameter was 6 and the short 5½ inches. This was from the regular stock, stamped from a single piece of black iron and tinned afterward. Of the ordinary work of pans from 8 to 11 inches deep and of large diameters, we might mention many other equally remarkable articles, but it is safe to say that in no other country of the world could those which we have described be made by stamping. This is also struck up from a single piece of sheet metal. A cream pitcher, oval in horizontal and vertical sections, 7 inches high. The diameters at the mouth were respectively 4 inches by 4½. At the largest point below,

used for the same were no longer questions of difficulty, and in this respect they had no drawback. The mechanical imperfections of the Danks machines were of such a serious character that the repairs had been very costly, and the loss of output by reason of frequent stoppage had affected the cost of production most unfavorably. It was at last agreed that new furnaces of a different construction should be adopted, and to that end one was erected as an experimental furnace. The directors were so satisfied with the work done by this machine that they had ordered five more and six sets of new engines to drive them. Mr. Jones went on to describe the mode of manufacturing puddled bars, at the Erimus Iron Works, and said that at the present time the company were working six furnaces, and they averaged nearly 300 tons per week of puddled, thus giving an output of 50 tons per furnace per week. The present consumption of coal for actual puddling was 9½ cwt. to the ton of bars. Of fettling (half bought and half from first heating or mill furnaces) 9 cwt. to the ton of pig, 20 cwt. of bars. The whole quantity of coal used to the ton of bars, including reheating, was under 20 cwt. The price paid to the puddlers was at present 3/2 to 4/10 per ton long weight, they paying their own underhands. The whole wages of every kind, including copal, refining, and reheating, was under 20/ per ton of bars. There was every prospect of the yield being increased to 500 tons per week from six furnaces. The company had no doubt that they would be able to bring the consumption of coal for puddling down to 7 cwt. to the ton of bars, and the whole of the coal consumed in the puddling department to 15 cwt.; and they anticipated that the wages would not exceed 15/ on the ton of bars, including all labor charges in the puddling department. Continuing his address, the president remarked Mr. Heath, with his usual enterprise, was one of the first to take up in earnest the Danks system of puddling. Mr. Heath informs me that he has had six Danks furnaces at work for some time, and has four additional furnaces ready for work. He is rolling from Danks blooms in the ordinary forge roll, 16 inch bars, 24 ft. long. Mr. Heath states that he is making these bars more cheaply than by the old puddling process, to say nothing of the saving in waste in cutting up long bars as compared with bars one-fourth the length. Mr. Crampton, who has made a long series of experiments on mechanical puddling, having been at work on the subject over five years, has produced some very excellent results as to quality of metal, and he assures me that his experimental machine at Woolwich is working very economically, and it will bear the test of continuous work. To use his own language: "The furnace is fitted to stand the rough usage to which such a machine must be subjected in ordinary iron works, and it involves a minimum of expense for wear and tear, and for general repairs." Mr. Crampton, in a paper read at the meeting of the Institute at Barrow, in September last, has so fully described his furnace, and the various ingenious appliances connected therewith, that I need not take up the time of the meeting in going over well-beaten ground. Mr. Crampton having in his very able paper exhausted the subject. Several of Mr. Crampton's furnaces are being erected at Middlesbrough, where his plans will be thoroughly tested, probably before our next meeting. I am sure that every member of this Institute must wish Mr. Crampton success. He has for a long period pursued the investigation of a very difficult subject with unflagging zeal, and he has shown much practical knowledge and great mechanical skill in working out his plans. Sir John Alleyne has also worked at this problem of mechanical puddling. He is experimenting with the Siemens rotator, and also with a modification of Maudslay's machine. Having next adverted to the Pernot furnace, which had been reported to be in fair working condition in France, the president observed: I think that we may now fairly expect that mechanical puddling in the hands of the many distinguished men who are now at work upon it will soon be brought into successful operation; and further, I think that it has been clearly demonstrated that the revolving puddling machine, of whatever type, if properly "fettled" and managed, produces far better results than hand puddling. By this method iron of very excellent quality can be made from pigs containing a large quantity of phosphorus, and I think it not unlikely that the puddling machine will very soon enable us to use largely some of the commoner qualities of pig iron for making steel. In the manufacture of steel, we are making in England by the Bessemer process alone 10,000 tons per week, and the production is rapidly increasing. Various mechanical improvements have been made, which enable us to turn out larger quantities. In some cases as much as one thousand tons per week have been made from a pair of converters. The Americans have set an excellent example in the many ingenious arrangements which they have introduced for getting a large amount of work out of a comparatively small plant. I believe that in this respect they stand at present unrivaled in England. We are following their lead, and we shall soon, I hope, be abreast of them. The president then described the Siemens-Martin process, which enabled them to produce at a moderate cost the same metal as that obtained by Mr. Bessemer's method. Speaking as a manufacturer (he observed), I am of opinion that, with our present knowledge, in no other form can iron or steel be produced at the same cost and of a quality equal to that of the steel made by the Bessemer and Siemens processes.

Our English correspondent, to whom we are indebted for the above, also sends us an abstract of the able and interesting address of Mr. Isaac Lowthian Bell, entitled, "Notes on a Visit to Coal and Iron Mines and Iron Works in the United States." It deals with matters of so much interest to our readers, however, that we prefer to wait until next week, by which time we hope to have received from Mr. Bell the copy of the address in full.

New Publications.

TROY STOVE WORKS: Catalogue of Stoves manufactured by Burdett, Smith & Co., 255 River street, Troy, New York.

In the matter of paper, type and presswork, this catalogue is exceptionally good, and is a credit both to the firm and their printer. We note the fact that in this catalogue there is considerable space devoted to descriptions of improvements, and to the explanation of the details of stoves. These descriptions are illustrated by diagrams by which the matter is made intelligible even to one not an expert in the trade.

After the usual opening address to patrons, Messrs. Burdett, Smith & Co. make an announcement to the public, which is so full of practical common sense, and so worthy to be in the hands of every man who has a stove to buy or sell, that we copy it bodily:

"In the back of this catalogue will be found the names of manufacturers in Troy and Albany, and all the stoves they produce or furnish repairs for. This list is complete and official, and although their predecessors' names may be on the stove, yet if you have the name, number and kind of stove correct, you will find no difficulty in getting repairs by addressing the firm whose number is opposite name of stove.

"Don't send to Troy firms for Albany repairs, or vice versa, as the cost and time between the two cities is just as great as if situated 100 miles apart. And we might suggest right here, when ordering repairs from manufacturers with whom you have no acquaintance, to send your money with the order; in this way you will be sure to get prompt shipment and a correct return of change.

"We think this list will prove so valuable for reference that we need hardly caution you to keep this catalogue in good order, and where you can always find it."

The list referred to consists of a list of the Troy and Albany stove manufacturers, in which the name of each firm is numbered. Then comes an alphabetical list of the stoves with reference letters, showing what the character of the stove is—range, heater, cook or parlor—and whether for wood or coal. Against each stove is the number of the firm making the stove. The value of such a list to the retail dealer can hardly be overestimated.

The catalogue shows a very large line of ranges, cook stoves, heaters and laundry stoves of new and attractive patterns. We note among a large number of noticeable things that the firm make a great variety of stoves for soft coal and wood. In heating stoves there is a good variety of attractive designs, while in laundry and tailor stoves there is a large representation.

The illustrations indicate a large stock, well adapted to meet the wants of purchasers.

THE COAL TRADE: A compendium of useful information relative to coal production, prices, transportation, etc., with facts for reference corrected to latest dates. Frederick E. Saward, Editor *Coal Trade Journal*. 100 pages.

This volume gives, in a compact form, a vast deal of valuable information in regard to coal and the coal trade, which it would be difficult, if not impossible, to obtain in any other shape. Mr. Saward's extensive practical knowledge of the coal trade gives him unusual facilities for producing a work of this kind, and enables him to give precisely such information as the practical coal man, whether dealer or operator, needs. The form in which the matter is placed is very good, and the information is conveyed in the fewest possible words. A considerable portion of the book is devoted to the different coal fields and the coals which they produce; tables at the close of each section show the statistical position of the coals described. Maps of different coal regions are introduced, together with numerous diagrams illustrating the geological formations. The tables of shipments and receipts at various points are very full, and the details are in convenient shape for reference. In addition to the figures for the anthracite region, statistics are presented of all the coal bearing regions in the United States, and also for many foreign countries, which gives the book a general value as a work of reference. We notice some very valuable tables and much useful information in relation to the coal trade of the Pacific slope, which has heretofore been counted out in most of the works upon the coal trade of the world. In the chapter of "Interesting Facts and Figures," we find a very large "seam" of what we should call first-class material in as good and convenient shape as could possibly be desired. Taken all in all, the book is one of the most valuable hand books of the kind that we have seen, and the author should find a good demand for it, as he has succeeded in making it a valuable consumer as to the producer and dealer. The consumer will find in the tables of the analyses of different coals much interesting and valuable information which has not before been in convenient shape, and also a great deal of new matter which is valuable. The remarks upon the qualities of the different kinds of coal are also useful in enabling the purchaser to gain a correct idea of the character of the various coals and the uses to which they are best adapted.

Scientific and Technical Notes.

The Engineer says that Mr. William White Cooper, the eminent oculist, has devised a new kind of

SPECTACLES TO PREVENT SNOW BLINDNESS.

"It is well known that a long exposure to the glare of the intense white of the snow in the Polar regions is most harmful to the sight; to meet this difficulty, spectacles of green tinted glass, surrounded by gauze, have been proposed. These will, however, fall in practice, as the glass part of the spectacles is liable to get dim and clouded, while the gauze and the wire, by means of which the spectacles are fastened behind the ears, will in an Arctic climate become so cold that to the human skin they will have the sensation of being made of red hot wire. Mr. Cooper's snow spectacles have neither glass nor iron in their composition, for they are made of ebonite, and are tied on to the head by a velvet cord. They resemble somewhat two half walnut shells fastened over the eye. Their great peculiarity, however, is that the wearer sees through a simple slit in front of the pupil of the eye. The sides of each eye box are perforated with minute holes, in order that the wearer can get a side view of objects. These glasses will also prove useful to travelers by railway, inasmuch as they keep out the glare of the sun, and prevent the admission of dust into the eye. To engine drivers, therefore, they would be invaluable, especially when exposed during sleet, snow storms, or very windy weather. They are also very agreeable when reading at night by lamp or gas light."

If the *Engineer* had been a little better posted in the matter of arctic affairs, it would have known that Mr. Cooper's invention was not new except in the material employed. The form is probably very old, and has been in use in the arctic regions for years, and, we believe, was an Esquimaux invention, at least was learned from them. We used a similar device, made from wood, years ago. It would be a great deal better to give the English engine drivers comfortable cabs, and put good headlights on the engines, as we do in this country, instead of proposing to put spectacles on the enginemen to keep the sleds out of their eyes.

The Krupp breech-loading gun, which has been attracting so much attention recently in the House of Commons, burst at the second round, and now lies in the

"CEMETERY" OF GUNS

In front of the royal gun factories, in the Royal Arsenal, Woolwich, in company with some hundreds of guns of various descriptions which have either prematurely given way or been tested to destruction. Close by are two of the guns constructed on the Woolwich system, and muzzle loaders, one having endured 2268 and the other 2308 rounds with the full charge of powder and the 64 pounder projectile before bursting, a result which was in each case preceded, according to the habit of wrought iron ordnance, by ample signs of warning, while guns of steel and cast metal seldom give notice of weakness before they actually explode. The Krupp gun has the breech piece snapped sharp off immediately in rear of the breech loading apparatus, while the fragments of the wrought iron gun are wrenched and distorted by great violence, and leave evidence of the obstinate resistance they have offered. The experimental gun which formed the model upon which the Woolwich guns have been designed, is exhibited not at the "Cemetery," but in the park of serviceable artillery at the gun factories, and it bears an inscription, as follows: "Nine inch muzzle loading rifled gun, experimental; Frazer's construction without breech piece, but reinforced with a double coil, thin steel barrel; fired 400 rounds with 30 lb. of rifle large grain powder, and 207 with 43 lb. charges, was then turned over and fired 500 rounds with 40 lb. charges; weight of projectile 250 lb. Total number of rounds, 1107. The gun can still be used, and by the introduction of a new tube can be rendered serviceable."

It is curious to note in regard to the **FIRST FLOATING MILLS,** that when Vitiges, a Gothic king, besieged the great Belisarius in Rome, in 536 A. D., he subjected the city to great suffering by stopping many large aqueducts. There was no water to drive the corn mills, and it was not till Belisarius floated some mills on boats into the Tiber that the difficulty could be overcome. There is, in some ancient history, a long and detailed account of the various and often ingenious measures that were adopted by the besiegers and the besieged for the attack and defence of these primitive floating corn mills. Flour mills of this description have existed to the present time, and may be seen on the Danube, the Rhine, and other large rivers of the Continent of Europe. For the most part they consist of a wooden structure erected upon a large boat, moved in the rapid current of the stream. Parallel, and at a short distance, another boat of smaller dimensions is placed, and between them a water-wheel is fixed, which is turned round by the current, and by this motive power the grinding of the wheat is effected, and in some cases the meal is bolted on the spot.

There has just been exhibited to the brethren of the Hull Trinity House, and to the principal ship owners of the port of Hull, England, **A NEW LIFEBOAT,** patented by Messrs. Anderson & Burkinshaw, of Burlington Quay, and it is by them termed the "Reversible Lifeboat." The inventors claim for it advantages which no other lifeboat possesses, viz., that it can neither capsize after being launched from a vessel's deck, nor can it sink. As its name implies, it is top and bottom both alike, and if in launching, before it touches the water, it should, by the rolling of the vessel, or any other cause, turn over, there are thwart and seats running round the side just the same as there would have been had the boat gone in the other way up. Whichever side the lifeboat takes the water, when she is once afloat, a couple of flaps running the whole length will close and form the bottom of the boat, and there is provision for drawing a further floor out, which will rest upon strong beams. The boat receives its unusual buoyancy from a massive belt of cork, which is encased in canvas, and runs from stem to stern on each side, and 40 separate air-tight tanks, 10 on each side of both the upper and lower part of the boat. Still further buoyancy is obtained by large tanks at each end of the boat, but it is intended to use these latter compartments as store-rooms, in which may always be kept a stock of provisions, spirits, clothes, medicines, water, &c., the whole supply being protected from damage by either rain or sea water. On each side of the belt of cork outside the boat there are numerous life-lines, which will hang in the water, so that anyone falling overboard on leaving a vessel may readily gain the boat and hoist themselves on board. In addition to this, there are lashed along what is intended to be the upper side of the boat as it stands on the vessel's deck, 12 cork life-buoys, six on each side, and should the boat in launching fall the other side up the life-buoys will disengage themselves and come to the surface, being equally available as they would have been had the boat not turned over. Captain Burkinshaw estimates that a boat of this kind, 30 feet long, will save at least 120 persons, either inside of her or standing upon the cork belt. It is intended that it shall be kept on deck, or on a hatchway even, and that a tram line shall be

placed from the boat's berth to the nearest gangway, by which means the boat can be launched without fear of any accidents with tackle falls, which in the hurry of leaving a sinking ship have so often been attended with fatal consequences.

The following composition, which is said

TO PRESERVE IRON FROM RUST.

is the invention of M. L. Machabee. It is also applicable to other materials, such as stone or wood, used in conjunction with iron or other metal, in the formation of reservoirs or other works: Virgin wax, 100 parts; Galipoli, 125; Norwegian pitch, 200; grease, 100; bitumen of Judea, 100; gutta-percha, 235; red lead, 120; and white lead, 20 parts; all of which, says the inventor, have their special value. The materials are mixed in a boiler in the order in which they are given, the gutta-percha being cut up in small pieces, or rasped. The mixture must be well stirred at each addition, and when homogeneous is poured into molds, and looks like chocolate. When used for preserving iron from rust, it is melted and laid on with a brush; but for stopping holes, &c., it must be in a pasty state. It may also be used as a glue to fix a piece of metal over a hole. For certain purposes, such as stopping holes in large vertical metal surfaces, the composition is slightly varied, the Galipoli being reduced to 115, the bitumen to 90, and the red lead to 100, while 40 parts of gum copal are added next to the gutta-percha.

M. Lostal, railway contractor, of Fennery, has communicated to the Society of Mineral Industry at St. Etienne the results of his observations on the effect of

LIME IN PRESERVING WOOD,

and his method of applying it. He piles the planks in a tank, and puts over all a layer of quicklime which is gradually slackened with water. Timber for mines requires about a week to become thoroughly impregnated, and other wood more or less time, according to its thickness. The wood acquires remarkable consistency and hardness, and, it is said, will never rot. Wood has been prepared in this manner for several mines, so that the plan will shortly be tested on a considerable scale. Beechwood has been prepared in this way for hammers and other tools for several ironworks, and it is said to become as hard as oak without losing its elasticity or toughness, and to last much longer than when unprepared. It has long been known that wood set in lime or mortar is preserved from decay, but no systematic plan for its preservation has until now been attempted.

Considerable interest has been recently excited in England by

NEW DISCOVERIES OF COAL.

at a point not many yards on the Birmingham side of the Wednesbury railway station, near the workings which have occasioned the interposition of the Board of Trade, where was lately a pond attached to the mill and also a croquet ground. It has been found to be an interesting section of the famous ten yard coal seam. The practical work of the Mines Drainage Commissioners having drained the mill pond, its bed was found to be thick coal, of which two yards had been worn away by having at a very early age thrust itself considerably above what is now the surface. Denudation and the recent overlying water have materially deteriorated the coal, which can be sold only as slack at 7 per ton. The owner of the property (Mr. Harton), is now sinking a shaft down to what he trusts may be marketable coal. It is not to be assumed that the cropping out of the ten yard seam is an unusual occurrence in South Staffordshire. On the contrary, the coal now and again appears, demonstrating the volcanic action to which this coal field has from time to time been subjected.

The interposition of the Board of Trade, mentioned in the above paragraph, was brought about by the

UNDERMINING OF A RAILWAY

In working this seam of coal. A parliamentary paper has been issued, containing the official correspondence and reports upon the undermining of the Great Western line near Wednesday. In the report to the Board of Trade, Col. Hutchinson and Mr. Baker say the working of a coal seam of such magnitude, and lying so near the surface of the ground, under a railway used for passenger traffic, is, in our opinion, of so dangerous a character that we fail to see how any precaution the company may adopt could adequately meet the risk to which the public would be exposed in traveling over this portion of the Great Western Railway. This report was sent to the home office, and letters have been addressed by the Secretary of the Board of Trade to the owner of the mine and to the Great Western Railway Company, to the effect "that the Board of Trade feel it their duty at once to take advice as to the steps which they can take to stop the working of the mine and the running of the trains, in case they do not learn by return of post, that some arrangements have been made between the Great Western Railway Company and the owner of the mine to prevent the danger."

The surveys for the

IMPROVEMENT OF THE TIBER,

as proposed by General Garibaldi, have just been completed by the government engineers, and show clearly the great difficulties, in a financial point of view, which would have to be encountered in carrying out such a project, whether on the right bank or on the left. The deviation on the left bank—which would be the most favorable—would not cost less than 135,000,000 francs, or £5,400,000; whilst that on the right, which would entail a certain length of cutting from 70 to 80 meters in depth, is estimated at 200,000,000 francs, or £8,000,000 sterling. In our opinion the most feasible scheme so far is that presented some time ago by a well known engineer, Signor Anderloni, who proposed rectifying the river in its course

through the city, giving it a clear water-way of 100 meters, and removing all obstacles—such as the Ponte San' Angelo—which in heavy floods dam back the waters, and cause them to overflow the banks and inundate the city. In the flood of 1870 the water stood at 150 meters above the soffit of the arches of that bridge. Such a work, including a handsome boulevard on each side of the river, with earth embankments for a considerable distance above and below the city, would not probably cost more than 50,000,000 francs, or £2,000,000 sterling, and would, no doubt, effectively prevent the recurrence of such floods as that of 1870, when, according to Signor Possenti, the president of the Commission for the Tiber, the discharge at Rome reached 2800 cubic meters per second. The removal of the obstacles and the rectification of the river would produce a lowering of the levels of the water in such a flood as that of 1870 of 322 meters at Ponte Molle, about four kilos, above Rome; of 402 meters at Ripetta, where the river enters the city; 178 meters at Ripetta Grande, where it leaves Rome; and 118 meters at the railway bridge, about 11½ kilos, lower still, or 6 kilos, below Ripetta. In this manner the flood level would be reduced at the Ripetta from 172 meters above the sea to 132 meters, or within the limits of safety. It would be necessary to construct intercepting sewers along the embankment to carry the drainage of the town some distance down the river, and in this manner there would be no danger of those parts of the city which are only 12 meters above the sea flooding.

Italy, it seems, has invented a new artificial fuel, largely composed of

OLIVE KERNELS,

which consists of an admixture of 75 per cent. of olive kernels, after the oil has been extracted, with 25 per cent. of peat, lignite, and other substances found in abundance in Italy and the South of France. The consumption, to produce a certain amount of heat, is stated to be somewhat less than coal, which costs from 47.6 to 55.8 per ton in Italy, while the cost price of this fuel is about 30.6 per ton.

The following table gives some interesting figures in regard to the

RAILWAY MILEAGE OF THE PRINCIPAL COUNTRIES

	Railroad.	Population.	Area of Miles.

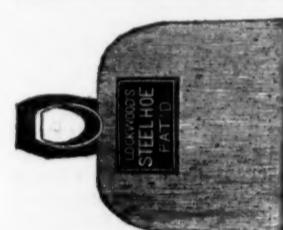
<tbl_r cells="4" ix="5" maxcspan="1"



Wellington Mills London EMERY.



SALE AGENCIES:
Macomber, Bigelow Dowse, Boston, Mass.
Homer, Foot & Co., - Springfield, Mass.
C. Foster & Co., - Worcester, Mass.
J. Clark Wilson & Co., New York City.
Chas. M. Ghriskey, - Philadelphia, Pa.
Belcher Bros., - Providence, R. I.
Baeder, Adamson & Co., Chicago, Ills.
Baeder, Adamson & Co., Cincinnati, Ohio.
Clemens Vonnegut, - Indianapolis, Ind.
Send generally
BY ALL PRINCIPAL DEALERS IN
Hardware
IN THE UNITED STATES.



Baltimore STEEL HOE Works.
O. H. HICKS & CO.
Manufacturers of ice
Lockwood Hoe,
Send for Sample and Price List.
BALTIMORE, MD.

"CHAMPION" Hog Ringer and Rings.



The only Ring invented that will effectually prevent Hogs from Rooting.
Being a Double Ring is equal to two or three of any other Ring. Having no sharp points in the flesh, it does not cause irritation or soreness as in other Rings. The smooth part of the wire being in the nose, it heals rapidly. One of our rings being equal to two or three of any other ring, makes this ring cheaper than the cheapest ring in the market. Time and money saved in using the Champion Hog Ringer. One operation and the work is done.

Price of Hog Ringer, 75c. each.
" Coppered Hog Rings, 50c. per 100. | Price of Tinned Hog Rings, 60c. per 100.
" Discount to the trade. | Hop Holder, 75c. each.

CHAMBERS & QUINLAN, Exclusive Manufacturers,
DECATUR, ILLINOIS.

Original Manufacturers of Tinned Rings.

The "Swift Mill."



AWARD SILVER MEDAL at the last Fair of American Institute, N. Y. The ever made. More than 30 different styles and modifications suited to Grocers and others. Full catalogue on application to the manufacturers.

LANE BROS., Millbrook, Dutchess Co., N. Y.

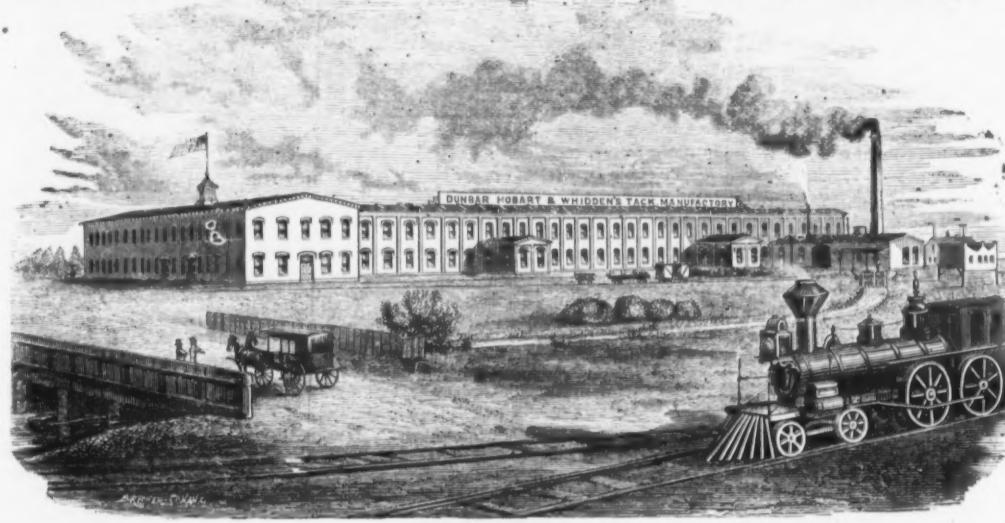
Or their General Agents, S. BAVILAND & SON, 259 Pearl St., N. Y. Also sold by the Hardware Trade.

HOBART'S TACKS.

MANUFACTURED BY
DUNBAR, HOBART & WHIDDEN,
Established 1810.

Office and Salesroom, 116 Chambers Street, New York

Factory, South Abington, Mass.



MANUFACTURERS OF American, Swedes and Copper Tacks,

Tinned, Leathered and Large Head Carpet Tacks, Finishing Nails, Black and Tinned Trunk Nails, Miners', Gimp, Lace and Brush Tacks, Hungarian, Chair, Cigar Box and Barrel Nails, Glaziers' Points,

IRON, STEEL, COPPER, ZINC AND BRASS SHOE NAILS,

Heel and Toe Plates, Steel Sharks, and Fancy Head Nails, Silver or Japanned Lining and Saddle Nails.

A full assortment always on hand at salesrooms, for immediate delivery if required. Odd and irregular sizes made to order or cut from sample at short notice. Send for Price List.

THE PULSOMETER,

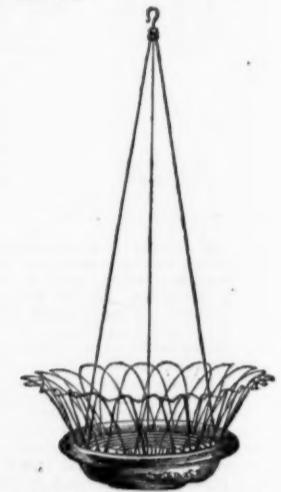
Patent Reservoir Vases and Hanging Baskets.

REDUCED PRICES FOR 1875.

Magic Pump.

The simplest, most durable and effective pump now in use. Adapted to all situations, and performs all the work of a hand pump, without consequent wear and care. No machinery about it. Nothing to wear out. Will pump gritty or muddy water without clogging. It can be easily repaired if get out of order. Branch Depots: 104 Sudbury St., Boston, Mass.; 1327 Market St., Philadelphia, Pa.; 39 W. St., Chi. St., Ill.; South Western Exposition, New Orleans, La.; 811 & 813 North Second St., St. Louis, Mo.

C. HENRY HALL & CO.,
20 Cortlandt Street, New York City.



These Vases are constructed with a reservoir base to contain water, which is drawn up into the vase by capillary attraction, keeping the earth sufficiently moist for ten to twelve days without attention. The advantage of this feature for CEMETERY USE will be readily seen. Send for circular giving styles and sizes.

The HANGING BASKETS are made on same principle, the reservoir bottom being spun of zinc, hand-some and decorated in various colors. There is no danger of their drying up; no necessity for taking them down to be watered; no dripping after watering.

Manufactured by

CHARLES E. WALBRIDGE,
297, 299 & 301 Washington St., BUFFALO, N. Y.
FERNALD & SISE, 100 Chambers Street, N. Y.
KELLOGG & KING, Detroit, Mich.
C. HENECKE & CO., Milwaukee, Wis.

Coopers' & Turpentine Tools.

Coopers' Drawing Knives, Coopers' Axes and Axes, Coopers' Froes, Stocked Croze and Irons, Coopers' Jointers, Trass Hoops, all sizes.

SCALES
For Rolling Mills, Furnaces, Foundries, Miners' Use.
SCALES
For Stores, Mills, and Wharves.
SCALES
For Elevators and Grain Warehouses.
SCALES
For Farmers, Butchers, Druggists, &c., &c.

ALSO,
The Most Perfect Alarm Cash Drawer,

MILES ALARM TILL CO., Also,

Herring's Safes, Coffee and Drug Mills, Letter Presses.

FAIRBANKS' STANDARD SCALES,

MANUFACTURERS,

E. & T. FAIRBANKS & CO.,
ST. JOHNSBURG, VT.

PRINCIPAL SCALE WAREHOUSES.

FAIRBANKS & CO., 311 Broadway, N. Y.

FAIRBANKS & CO., 166 Baltimore St., Baltimore, Md.

FAIRBANKS & CO., 88 Camp St., New Orleans.

FAIRBANKS & CO., 338 Broadway, Albany, N. Y.

FAIRBANKS & CO., 408 St. Paul St., Montreal.

FAIRBANKS & CO., 34 King William St., London, Eng.

FAIRBANKS & CO., 100 Congress St., Boston, Mass.

FAIRBANKS & EWING, Masonic Hall, Phila., Pa.

FAIRBANKS, MORSE & CO., 139 Walnut St., Cincinnati, O.

FAIRBANKS, MORSE & CO., 182 Franklin St., Cleveland, O.

FAIRBANKS, MORSE & CO., 48 Wood St., Pittsburgh.

FAIRBANKS, MORSE & CO., 5th & Main St., Louisville.

FAIRBANKS & CO., 309 & 314 Washington Av., St. Louis.

FAIRBANKS & HUTCHINSON, San Francisco, Cal.

For sale by leading Hardware Dealers.

PRINCIPAL SCALE WAREHOUSES.

FAIRBANKS & CO., 311 Broadway, N. Y.

FAIRBANKS & CO., 166 Baltimore St., Baltimore, Md.

FAIRBANKS & CO., 88 Camp St., New Orleans.

FAIRBANKS & CO., 338 Broadway, Albany, N. Y.

FAIRBANKS & CO., 408 St. Paul St., Montreal.

FAIRBANKS & CO., 34 King William St., London, Eng.

FAIRBANKS & CO., 100 Congress St., Boston, Mass.

FAIRBANKS & EWING, Masonic Hall, Phila., Pa.

FAIRBANKS, MORSE & CO., 139 Walnut St., Cincinnati, O.

FAIRBANKS, MORSE & CO., 182 Franklin St., Cleveland, O.

FAIRBANKS, MORSE & CO., 48 Wood St., Pittsburgh.

FAIRBANKS, MORSE & CO., 5th & Main St., Louisville.

FAIRBANKS & CO., 309 & 314 Washington Av., St. Louis.

FAIRBANKS & HUTCHINSON, San Francisco, Cal.

For sale by leading Hardware Dealers.

PRINCIPAL SCALE WAREHOUSES.

FAIRBANKS & CO., 311 Broadway, N. Y.

FAIRBANKS & CO., 166 Baltimore St., Baltimore, Md.

FAIRBANKS & CO., 88 Camp St., New Orleans.

FAIRBANKS & CO., 338 Broadway, Albany, N. Y.

FAIRBANKS & CO., 408 St. Paul St., Montreal.

FAIRBANKS & CO., 34 King William St., London, Eng.

FAIRBANKS & CO., 100 Congress St., Boston, Mass.

FAIRBANKS & EWING, Masonic Hall, Phila., Pa.

FAIRBANKS, MORSE & CO., 139 Walnut St., Cincinnati, O.

FAIRBANKS, MORSE & CO., 182 Franklin St., Cleveland, O.

FAIRBANKS, MORSE & CO., 48 Wood St., Pittsburgh.

FAIRBANKS, MORSE & CO., 5th & Main St., Louisville.

FAIRBANKS & CO., 309 & 314 Washington Av., St. Louis.

FAIRBANKS & HUTCHINSON, San Francisco, Cal.

For sale by leading Hardware Dealers.

PRINCIPAL SCALE WAREHOUSES.

FAIRBANKS & CO., 311 Broadway, N. Y.

FAIRBANKS & CO., 166 Baltimore St., Baltimore, Md.

FAIRBANKS & CO., 88 Camp St., New Orleans.

FAIRBANKS & CO., 338 Broadway, Albany, N. Y.

FAIRBANKS & CO., 408 St. Paul St., Montreal.

FAIRBANKS & CO., 34 King William St., London, Eng.

FAIRBANKS & CO., 100 Congress St., Boston, Mass.

FAIRBANKS & EWING, Masonic Hall, Phila., Pa.

FAIRBANKS, MORSE & CO., 139 Walnut St., Cincinnati, O.

FAIRBANKS, MORSE & CO., 182 Franklin St., Cleveland, O.

FAIRBANKS, MORSE & CO., 48 Wood St., Pittsburgh.

FAIRBANKS, MORSE & CO., 5th & Main St., Louisville.

FAIRBANKS & CO., 309 & 314 Washington Av., St. Louis.

FAIRBANKS & HUTCHINSON, San Francisco, Cal.

For sale by leading Hardware Dealers.

PRINCIPAL SCALE WAREHOUSES.

FAIRBANKS & CO., 311 Broadway, N. Y.

FAIRBANKS & CO., 166 Baltimore St., Baltimore, Md.

FAIRBANKS & CO., 88 Camp St., New Orleans.

FAIRBANKS & CO., 338 Broadway, Albany, N. Y.

FAIRBANKS & CO., 408 St. Paul St., Montreal.

FAIRBANKS & CO., 34 King William St., London, Eng.

FAIRBANKS & CO., 100 Congress St., Boston, Mass.

FAIRBANKS & EWING, Masonic Hall, Phila., Pa.

FAIRBANKS, MORSE & CO., 139 Walnut St., Cincinnati, O.

FAIRBANKS, MORSE & CO., 182 Franklin St., Cleveland, O.

FAIRBANKS, MORSE & CO., 48 Wood St., Pittsburgh.

FAIRBANKS, MORSE & CO., 5th & Main St., Louisville.

FAIRBANKS & CO., 309 & 314 Washington Av., St. Louis.

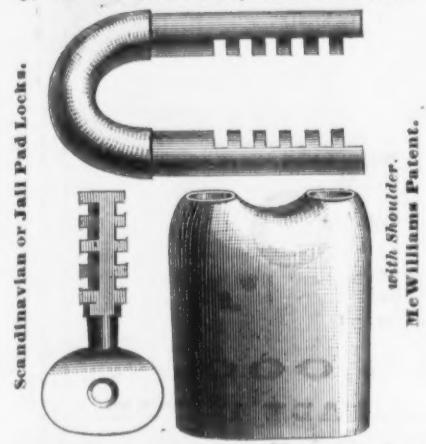
FAIRBANKS & HUTCHINSON, San Francisco, Cal.

For sale by leading Hardware Dealers.

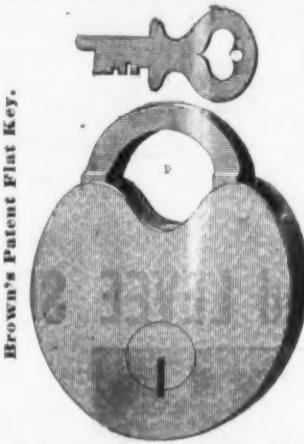
PRINCIPAL SCALE WAREHOUSES.

FAIRBANKS & CO.,

J. H. McWILLIAMS, Manufacturer of PYES' PATENT PAD LOCKS.



Scandinavian or Jail Pad Locks.
with Shoulder.
McWilliams Patent.



Brown's Patent Flat Key.
Brown's and Iron and with chain.

JOHN J. TOWER, Sole Agent, 96 Chambers St., N. Y.

THE KNOX PATENT Fluting Machine,

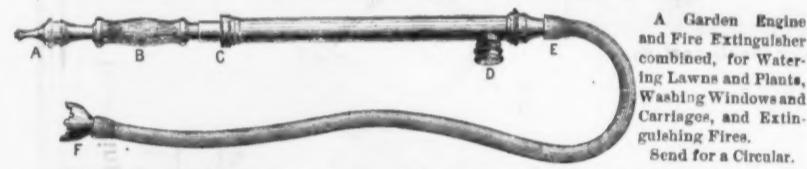
MANUFACTURED AND FOR SALE LOW BY

C. S. OSBORNE & CO.,
Newark, N. J.
Tack & Upholsterer's Hammers,
Can Openers, Screw Drivers,
GAS PLYERS, &c.

SEND FOR LIST.



THE HYDRONETTE.



JESSE A. LOCKE, Agent, No. 32 Cortlandt Street, New York.

THE ERIE
Lawn Mower.
Best in Market.
WITH IMPROVED
ADJUSTABLE CUT.
Manufactured by
H. M. REED & CO.
Erie, Pa.
Send for Circular and Price List.



REED & BARTON,

Manufacturers of FINE

Electro-Plated Table Ware OF EVERY DESCRIPTION,

Would call especial attention to their new
Patent China-Lined
ICE PITCHERS.



These Pitchers are made of the finest quality of white metal, heavily plated with silver. They are finely engraved and chased in a great variety of decorations. The linings are of fine stone china. The top is secured to the body of the Pitcher in such a manner that it can be easily detached and the lining removed for cleaning or other purposes.

Many improvements attained are noticeable in these Pitchers. Water and ice standing in them do not come in contact with any metal whatever. They are perfectly clean, and easily kept so. They are perfectly free from all odor or rust. Lemonade, beer, milk, etc., may be kept cool and drunk from these pitchers without endangering health. There can be nothing cleaner or purer for holding liquids than pure, white china. There is no possibility of leakage.

The construction of the Pitcher is such that the lining can be easily replaced at a very small cost.

Factories, Taunton, Mass.,
Salesroom, No. 2 Maiden Lane, New York.

Tredegar Horse and Mule Shoes.

These superior Shoes are made of the Best Virginia Charcoal Iron. They are well adapted to Western and Southern demand, and are shipped to all prominent markets at freights as low as our other makers.

THE TREDEGAR COMPANY, Manufacturers,
Tredegar Iron Works, Richmond, Va.

SEMPLE, BIRGE & CO., Sole Western Agents, ST. LOUIS, MO.



Are Equal to any for Use. TRY THEM.

THE "HISCOX" FILES AND RASPS MANUFACTURING CO., LOWELL, MASS.

Heating with Steam and Hot Water.

By Gen. ARTHUR MORIN, Director of the Conservatory of Arts and Trades, Paris.

[We condense the following from a translation of Gen. Morin's treatise on "Warming and Ventilating Occupied Buildings," made by Mr. C. B. Young for the Smithsonian Institute report, just received]:

STEAM HEATING.

The rapid circulation of steam, even under very slight pressure, and the large amount of heat it gives out in condensing, are the principal advantages of this mode of heating, which only requires, for the passage of the steam, pipes of small dimensions, but it has with the forms of apparatus most in use very grave defects.

Irregularities in the fire affect very sensibly the circulation of steam, and want of attention, especially apt to occur during the night, leads to condensation. When the fire becomes hot again, the steam, which then flows quickly into the pipes, where a partial vacuum has formed, meeting a great deal of condensed water, drives it violently, and the shocks occasionally produce explosions, often cracks and leaks, or at least very frequent disagreeable noises. These great objections have generally led to the abandonment of warming by direct steam circulation, except in factories where the escape steam from the engines is made use of. In that case it flows constantly through large exposed pipes, having a slope sufficient to prevent the accumulation of condensed water. But when it is designed to warm dwellings by carrying the steam through thin floors, the difficulties increase, and all the unpleasant effects become manifest.

Grouvelle, a skillful civil engineer, has designed and constructed for several hospitals an arrangement in which the steam does not directly heat the radiators placed in the rooms, but the steam pipes heat water placed in those radiators. This system, in consequence of the great density of water and its imperfect conductivity of heat, prevents the too sudden checking of the radiation when the flow of steam is diminished or stopped. These radiators have, on top, a opening, which prevents the temperature of the water from rising above 21°, and the pipes which furnish a passage for the air coming in from the outside do not allow the temperature of that air to exceed 104° or 113°.

Special arrangements also allow the steam to be carried through the radiators, or through external pipes, so as to moderate the temperature of the room by using only a few of the radiators. But if this plan secures a more regular warmth, it does not prevent trouble from condensation in the pipes passing through the floors, nor from leaks, which are always difficult to discover and to stop. Some accidents which have happened at Lariboisiere Hospital have shown that this system is not entirely free from sudden ruptures.

The advantages of steam heating may be retained, without its principal defects, by arranging the circulating pipes vertically in shafts formed in the thickness of the walls, or specially built for them, as has been done in some wards of the Vincennes Hospital, or as d'Hamelcourt has arranged it for the circulation of water at the company's office at the Northern Railway. Some of these pipes may be exposed in the form of columns, and be used for warming the hands or the feet, as is done in many establishments in Germany and Switzerland.

These arrangements, which agree very well with the condition that the fresh air should enter near the ceiling, secure the immediate return of the condensed water to the boiler, and, therefore, greatly diminish the effects of leaks, which would be more easily prevented than in the forms usually adopted at present.

Nothing should prevent the adoption, in each ward of a hospital, of an evaporator warmed by steam on Grouvelle's system, in order to promote the comfort of the patients. It is proper to add that when the radiators and pipes have a heating surface of 215 to 258 feet for 35,316 cubic feet capacity of halls, an elevation of temperature of 29° or 30° may be obtained even in the coldest weather. At Lariboisiere Hospital the proportion is 280 square feet, and it is evidently greater than necessary. But there remains against steam heating the charge of being too readily affected by irregularities in the fire, and particularly by want of attention on the part of the firemen, which during the night may be very much prolonged.

HOT WATER HEATING APPARATUS.

This system of warming, which has been known and in use for a long time, with various modifications, is much less apt to cause sudden variations of temperature than the preceding, since hot water vessels and pipes of equal capacity always contain a much greater number of units of heat than if filled with steam. The great density of water and its steady circulation through the heater long after the fire has become low, maintain a very regular heat in spite of temporary want of attention.

The temperature of the air warmed by this apparatus is always very moderate. It is even difficult to raise it above 100° or 112° with large radiating surfaces. In this respect this method of heating is very healthy, provided that ample ventilation be maintained in addition.

It is not essential to follow L. Duvolr's plan of placing regulating receivers in the upper part of the house to which the warm water ascends. In order to secure a sufficiently rapid circulation by the difference in the density of the high ascending and descending columns.

Heating apparatus of this kind in use at Guy's Hospital, London, at the Sydenham Palace, and all those used in warming greenhouses, prove that, provided that the pipes be sufficiently large, a small difference in height between the ascending and descending pipes is sufficient to maintain the circulation with even a slight difference of temperature. Another conclusive example is found in the apparatus used in warming some baths.

The hot water circulating pipes may be arranged to warm the air either in the lower portions or in vertical shafts built in or against the

walls, through which the outside air passes and becomes warmed by contact with the pipes.

The first arrangement, in which the pipes may be in sight throughout their whole length and placed in easily accessible places, renders leaks of little consequence, and allows them to be easily found and stopped. The second, which is used by d'Hamelcourt, and in which blind hole plates are placed at the top of each section, gives almost the same facility, and allows of the removal of the leakage water.

Both these plans are more cheaply applied than that which has been adopted by L. Duvolr Leblanc, who carries the water in the thickness of the floors, and they are free from the somewhat too severe condensation which has been visited upon the plans of that builder. In these systems, radiators may be entirely dispensed with or confined to one in each ward for the comfort of the patients.

PROPER PROPORTIONS OF HEATING SURFACES.

A hot water heating apparatus does not give out as much heat as a steam heating apparatus with the same surface. An examination of the results obtained at Lariboisiere hospital shows that a heating surface of 291 square feet for rooms with a capacity of 35,316 cubic feet is scarcely sufficient in very cold weather, and we think that it would be better to give to the radiators or receivers placed within the rooms to be warmed at least 325 to 344 square feet of total heating surface for that capacity of 35,316 cubic feet in places similar to hospitals.

In regard to apparatus placed in cellars and designed to warm air which is carried thence through pipes which may cool it, or into rooms not kept constantly warmed, prudence requires that the heating surface should be 538 square feet for warming rooms containing 35,316 cubic feet, and it is also necessary that the air should not be carried to a great distance. In general, this system has a smaller heating capacity than that in which the water is carried in pipes or through the air passages. But when the heater, the pipes and the radiators are all contained in the room to be warmed, the loss from waste heat is reduced, as in the case of stoves, to that carried off by the chimney. Beside, since the heat requires to be kept moderate, this system unites the advantage of healthfulness to that of economy of fuel, and appears to me as a system of general heating preferable to the other systems employed for the same purpose. Under these conditions, the total heating surface might be reduced to 269 square feet for heating rooms of 35,316 cubic feet.

A regular, moderate and constant temperature being much better secured by a circulation of water that can be increased, checked, or even stopped, partially or entirely, as well as in the systems making use of steam, we believe that it should generally have the preference, especially in the case of hospitals.

HEATING BY THE CIRCULATION OF WATER OF VERY HIGH TEMPERATURE.

In regard to that system of heating by the circulation of water of high temperature known under the name of Perkins' system, where the water often attains a temperature above 572°, it cannot, without danger, be carried through pipes placed in the thickness of the floors or near pieces of wood, which would be slowly affected by so high a temperature and disposed to spontaneous combustion, as more than one fire has shown. Also, at present, in establishments where this system of warming has been adopted, all the pipes are in full view, and hung against the walls or ceilings, which makes a very unpleasant appearance. It is, beside, essential to surround with a grating or case those portions of these pipes which are in contact with the building in order to prevent serious accidents. On all these accounts we do not think it proper in any case to make use of this system of heating.

COMBINATION OF HOT WATER AND HOT AIR HEATING APPARATUS.

The difficulty of heating by means of a hot air furnace to a greater distance than 40 or 50 feet horizontally from the heater may be overcome, as we have said before, by placing in the furnace either a boiler or tubes, called bottles, leading into the hot water pipes communicating with the radiators and the return pipes. In this way a combined system of heating is obtained, one part by warm air and the other by warm water, the latter being capable of useful effect at a great distance.

COMBINATION OF WARMING AND VENTILATION.

Apparatus for heating by steam, hot water, and by both air and water, may easily be connected with arrangements for direct ventilation, water or steam vessels being placed in the pipes or in the chimney to give it the proper activity.

GENERAL CONCLUSIONS FROM EXPERIMENTS ON HEATING APPARATUS MADE IN 1865-66.

Experiments, the results of which I have given in notes appended to the Annals of the Conservatory, together with those which I have already published on fire-places, lead to the following classification of the different forms of heating apparatus examined, made with reference to their heating effect; that is, the ratio of the heat which they give out directly or indirectly in the places for which they are intended, to that developed by the fuel consumed. The table also shows their advantages and defects as regards ventilation and effect on the fumes usually adopted at present.

GENERAL CONCLUSIONS FROM EXPERIMENTS ON HEATING APPARATUS MADE IN 1865-66.

Experiments, the results of which I have given in notes appended to the Annals of the Conservatory, together with those which I have already published on fire-places, lead to the following classification of the different forms of heating apparatus examined, made with reference to their heating effect; that is, the ratio of the heat which they give out directly or indirectly in the places for which they are intended, to that developed by the fuel consumed. The table also shows their advantages and defects as regards ventilation and effect on the fumes usually adopted at present.

CLASSIFICATION OF HEATING-APPARATUS IN REGARD TO HEATING EFFECT.

Form of Apparatus.	Percentage of Heating Effect.	Remarks.
Ordinary fire-places.	10-12	CARRY OFF FOUL AIR, BUT DO NOT DIRECTLY BRING IN FRESH AIR. EFFECT OF SYSTEM HARMFUL, UNHEALTHY, UNDERRATED.
Common stoves, without circulations of air.	30	CAST IRON, BURNING COKE, COAL, OR WOOD.
Model stoves, with circulation of air.	57	SPONTANEOUS BURNING, WOOD, CHARCOAL, OR COKE.
Model stoves, with circulation of air, outside or inside.	68	WITH PARAFFIN, OIL, COKE, OR SPONTANEOUS BURNING, WOOD, CHARCOAL, OR COKE.
Stoves with pipes.	90	DO NOT PRODUCE SUFFICIENT CHANGE OF AIR AND HEAT, ONE SWINGING AIR TUBE.
Horizontal.	60	WHEN THE PIPES ARE VERY NUMBEROUS, AND THE BOILER WITH THEM, THE RADIATORS ON THE OTHER SIDE OF THE ROOM ARE COMMUNICATED IN THE PLACES TO BE WARMED.
Vertical.	65-70	WHEN THE PIPES ARE NUMBEROUS, AND THE BOILER WITH THEM, THE RADIATORS ON THE OTHER SIDE OF THE ROOM ARE COMMUNICATED IN THE PLACES TO BE WARMED.
For circulation of water.	80	DO NOT PRODUCE SUFFICIENT CHANGE OF AIR AND HEAT, ONE SWINGING AIR TUBE.
Vertical.	85-90	WHEN THE PIPES ARE NUMBEROUS, AND THE BOILER WITH THEM, THE RADIATORS ON THE OTHER SIDE OF THE ROOM ARE COMMUNICATED IN THE PLACES TO BE WARMED.

REVOLVING SCRAPER CO.

OF
COLUMBUS, O.

Manufacturers of DOTY'S REVOLVING ROAD and LEVEE SCRAPER.

FOR
Earthwork, Excavations & Embankments

OF ALL KINDS,

ROAD MAKING,

DITCHING,

DRAINING,

And moving Earth, Sand or Gravel,

NEEDS BUT A TRIAL TO ENSURE THEIR
CONTINUED USE.

DURABLE, STRONG, CHEAP.

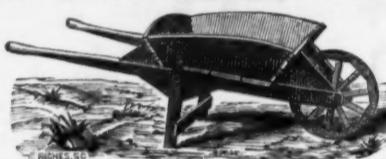
"MAMMOTH" R. R. PLOW,

"Automatic"



One Hundred Revolving Scrapers at work on the Union Levee, near Cincinnati, O.

SEND FOR CIRCULARS AND PRICE LISTS.



Jacob's Patent Self-Oiling R. R. and Canal Barrow.

20,000
ARE ALREADY IN USE.

SAVES

TIME.—Rights itself after dumping its load.

LABOR.—Only one man needed to do the work. No "fillers" needed.

MONEY.—Does more work in the same time than any others.

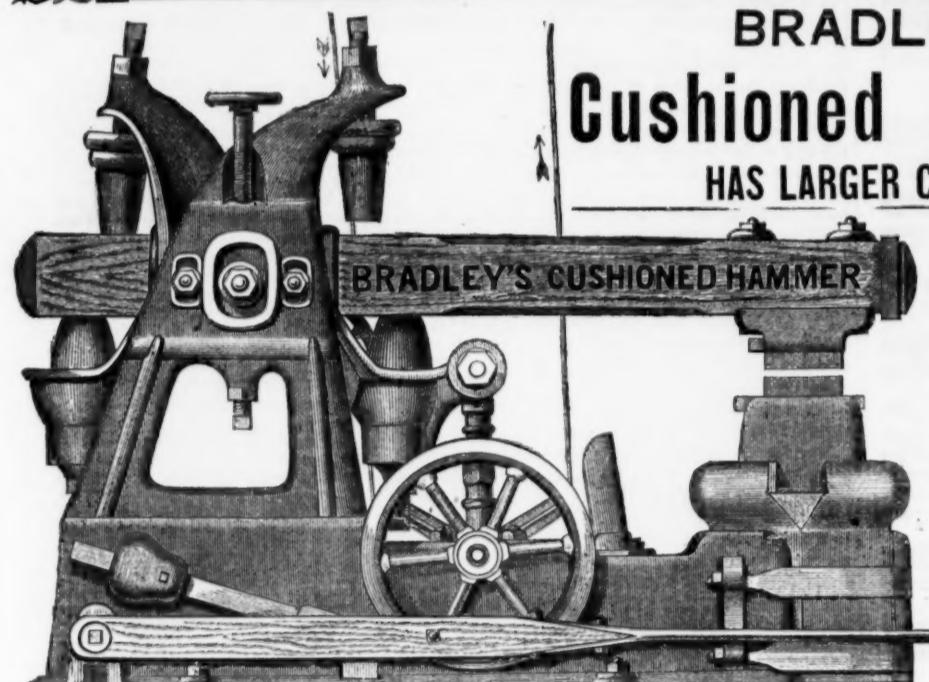
Jacob's Pat. Wheelbarrow



Office, Room 5, Deshler Building, corner High and Town Streets, Columbus, O.

BRADLEY'S

Cushioned Hammer HAS LARGER CAPACITY,



IS MORE DURABLE,
TAKES UP LESS ROOM,
DOES MORE & BETTER
WORK WITH LESS EXPENSE
FOR POWER and
REPAIRS than any other
Hammer in use.

GUARANTEED
as RECOMMENDED.
Address,

Bradley Mfg. Co.
Syracuse, N. Y.

J. CLARK WILSON & CO.,

American and Foreign Hardware Commission Merchants,
81 BEEKMAN STREET, N. Y., Sole Agents for New York, of
The MILLER BROTHERS CUTLERY CO.'S
Superior American Pocket Cutlery.

Patented May 24 and Aug. 2, 1870. Reissue December 29, 1874. Patented February 1875.
EACH KNIFE WARRANTED.



No. 924, Fold German Silver Linings and Bolster, Side Linings and Bolster of one Piece,
Shell, 4 Blades.

The only Knives manufactured on the American Plan,
all others manufactured in this country being but imitations of Foreign makers.
We can confidently recommend these Knives as being in quality and finish equal to the best imported.
A full line always in stock.

SEND FOR PRICE LIST.

RHODE ISLAND HORSE SHOE CO.,
OFFICE, 81 Canal Street, Providence, R. I. WORKS at Valley Falls, R. I.
Manufacturers of

PERKINS and RHODE ISLAND PATTERNS of
HORSE AND MULE SHOES.

The best machine
by far, for the trade
and the public.

"Champion."
Give universal satisfaction.

Is highly recommended by all dealers
that keep it.

"Champion."
Everybody that has tried
the

"CHAMPION"
prefers it to any other
machine made.

Acknowledged the Best.

Send for Price List.

CHAS. FELDER, 103 Chambers St., N. Y.

TACKS & SHOE NAILS, Upholstery, Gimp, Brush, Card & Pail Tacks,

Leathered, Tinned and Large Head Iron Carpet Tacks, Finishing Nails made expressly for black walnut
work, Clout and Trunk Nails, black or tinned, warranted to clinch.

Hungarian, Cigar Box and Chair Nails, Boat Nails of Copper or Iron.

Zinc, Copper, Steel and Iron Shoe Nails, Slating and Roofing Nails, 3d and 2d Fine Nails, Roofing Tacks
Brads, Patent Brads, Dowel Brads for cabinet makers' use, etc., etc.

Any Size or Style of Tack or Nail made to sample. TINNED TACKS AND NAILS of every variety.

MADE BY THE

AMERICAN TACK COMPANY,

FACTORY, Fairhaven, Mass.

Orders sent to either place will receive prompt attention.

Designing & Engraving ON WOOD.

Done in the best manner at the office of *The Iron Age*
and *The Metal Worker*,
10 Warren Street, New York.
Estimates given for Catalogues, Posters, &c.
Isaac F. Eaton. Geo. B. Collins.

AMES' GENUINE CHESTER EMERY

has been reduced from 7c. to 6c. per lb.
for grains in kgs. Flour and Fine Flour
remaining at 4c. per lb., as heretofore.
Important discounts to the trade.
Send for Circulars.

E. V. HAUGHWOUT & CO.,
26 Bushman Street, New York.

The Sugar Maker's Friend.

PRICE,
per hundred
pounds.
Used Metallic Emery, Soap
Spout and Hatchet. It is
designed for the use of
Circulars and Terms sent on re-
ceipt of 20cts to pay postage. Address,
C. C. Post, Manufacturer & Patentee, Burlington, Vt.

Designing & Engraving ON WOOD.

Done in the best manner at the office of *The Iron Age*
and *The Metal Worker*,
10 Warren Street, New York.
Estimates given for Catalogues, Posters, &c.
Isaac F. Eaton. Geo. B. Collins.

The Sugar Maker's Friend.

PRICE,
per hundred
pounds.
Used Metallic Emery, Soap
Spout and Hatchet. It is
designed for the use of
Circulars and Terms sent on re-
ceipt of 20cts to pay postage. Address,
C. C. Post, Manufacturer & Patentee, Burlington, Vt.

Reasons for Using our Goods.

Hogs when ringed are prevented from rooting, and fatten quickly.

Pastures and clover fields are kept smooth and are not destroyed by the hogs rooting them up.

Feed lots in the winter are kept smooth, and corn that is otherwise rooted and tramped into the ground is saved.

The Triangular Wire Ring, manufactured only by us, is the only wire ring that can be inserted in the hog's nose with one grip on the Ringer, and is the only ring that will remain in a hog's nose, as it fits close, will not turn in for the joint to irritate the nose, is not liable to be torn out, and heals quickly.

No puncturing of the nose required to insert our ring.



For Sale by the Leading Jobbing Hardware Houses of New York, Philadelphia, Baltimore, Cleveland, Columbus, Cincinnati, Dayton, Indianapolis, Lafayette, Chicago, Milwaukee, Burlington, Davenport, St. Louis and San Francisco.



THE CUNARD COOKING STOVE,

With an improved construction of Reservoir for Hot Water, The New Automatic Hot Air Flue, Clinkerless Grate and Illuminated Front, and with the New Patent Ash Sifter

FOR ANTHRACITE or BITUMINOUS COAL or WOOD.

Manufactured by

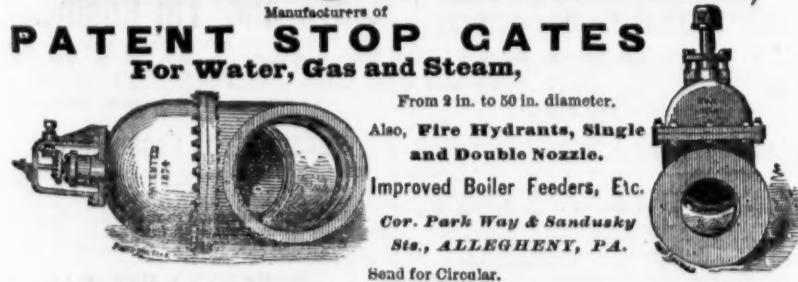
Perry & Co.,

ALBANY, 115 Hudson Ave.

NEW YORK, 86 Beekman St.

CHICAGO, 15 & 17 Lake St.

Armstrong & Hutchinson,
Manufacturers of
PATENT STOP GATES
For Water, Gas and Steam.



From 2 in. to 50 in. diameter.
Also, Fire Hydrants, Single and Double Nozzle.

Improved Boiler Feeders, Etc.

Cor. Park Way & Sandusky Sts., ALLEGHENY, PA.

Send for Circular.

H. E. NEIL, President. H. A. LANMAN, Treas. & Manager. F. G. WADDEN, Secretary.

COLUMBUS BOLT WORKS,
COLUMBUS, OHIO,

Manufacturers of **BEST NORWAY IRON**

Carriage, Steeple, Cone, Shackle, Elliptic, Shaft and Tire



All the different styles used by the manufacturers of the finest Carriages. Every Bolt warranted true to size and fit. Illustrated Price Lists mailed on application. Our facilities are unsurpassed for the manufacture of Machine Bolts and Coach Screws. Correspondence from Car, Bridge and Machinery Builders solicited.



CLARK & CO.'S
Self-Coiling, Revolving
STEEL SHUTTERS

For Store Fronts & Rear Windows.
FIRE AND BURGLAR PROOF.

Also, **SELF-COILING**

Wood Shutters

In various kinds of wood, suitable for Store Fronts, Private Houses, Offices, and School Partitions.

The Best & Cheapest Shutters in the World.

All Real Estate owners are invited to inspect them at the factory,

918 West 26th Street, New York.

JAS. G. WILSON, Manager.

Chicago Office, 54 La Salle Street.

SOMETHING NEW.

We shall this present season make a **Heavy Tinned Wire Ring** that will not rust in the hog's nose. The strongest and best ring in the market.

Prices.

Ringers, retail	\$1.00
" per doz.	6.00
Rings per box (100) coppered wire.....	50
" per box (100) "	3.00
" per box (100) tinned wire.....	60
" per box (100) tinned wire 4.00	
Tongs or Holders, retail.....	1.25
" " per doz.	9.00

The coppered wire ring will be sent unless otherwise ordered.

Samples by mail postpaid on receipt of retail price.

Goods sent C. O. D. with privilege of examination before paying charges.

Net prices in quantities, circulars and posters mailed free.

Our advertisements are now inserted in over 1800 newspapers, published in every State of the Union, so that dealers will find a large demand created for our goods.

Liability of "Consolidated" Companies for Obligations of the Old Ones.

The facts in the recent case of Prouty vs. The Lake Shore Railway Company (52 N. Y. 263), will sufficiently appear in the following opinion:

In so far as the property formerly of the Michigan Southern and Northern Indiana Railroad Company is concerned, the present consolidated company is the successor of the former company; but in respect to the properties of the other companies, which have joined in the consolidation, it is a new and independent company, as to the creditors of the old Michigan Southern and Northern Indiana Railroad Company, and they have no claim upon such new company under their original contracts, but only by virtue of the assumption by the new company of the obligations of the several corporations which united in the consolidation. So of the individual defendants. In so far as the trust devolves upon them of managing the property formerly of the old company, they occupy, in relation to the plaintiff, the position of successors to the individual defendants named in the complaint, and are bound by all proceedings had against their predecessors. But as to the other properties which have come under their charge, they are successors to officers of other companies against whom the plaintiff had no right of action upon his original contract. Therefore both as to the corporation defendant, and the individual defendants brought by the order of substitution, if the only effect of the substitution was to continue against them proceedings which affected the property of the original defendants, the case would be simply one of the substitution of new parties representing the same interests as the original defendants, and this might properly be done by motion within one year (code § 121).

But the effect of the substitution in the present case is much more extensive. It not only continues the proceedings against the successors of the original defendants, but against a corporation, and the treasurer and directors thereof, having control of and being vested with the property formerly of two other companies, not originally liable upon the contract by virtue of which the plaintiff claims; and subjects the property of those two companies to a decision rendered subsequently to the consolidation in an action to which they were not parties.

In the action as originally brought, the defendant being a foreign corporation, a judgment could only be enforced against such of the property of the defendant as could be found within the State, and by personal remedies against such of the officers as resided within this State, or were here found and served with process in the action. By the decision of the referee, the directors and treasurer of the original corporation defendant were not only required to pay the amount found due to the plaintiff for back dividends, but were also restrained from making any disposition of the funds, effects of property of the corporation defendant, or any part thereof, and from declaring or paying any dividends on its common stock, until the claims of the plaintiff and all other holders of the guaranteed stock described in the complaint should be satisfied in full. The substitution of the present consolidated company and its officers as defendants in place of the old Michigan Southern Company, and its officers, the original defendants, makes all these provisions obligatory upon the substituted defendants, and subjects them, and all the funds and property of the consolidated company, to the restraint adjudged against the old Michigan Southern Company.

It may be said that the obligations which the consolidated company has assumed render it just that such a judgment should ultimately be rendered against it. But however clearly it may appear that the plaintiff and those in whose behalf the action purports to be brought are entitled to such a remedy, it can legally be obtained only in an action against the parties affected, founded upon their assumption of the liabilities of others, and not by the summary process of a motion to insert their names as defendants, and thus to apply to them an adjudication previously made against the original debtors.

What Cheap Electricity is Expected to do.—The recent improvements in magneto-electric apparatus, in which, as is well known, all expensive batteries are discarded, being driven by steam-power alone, at an expense of

5 cents per horse-power per day, have given such encouraging results that it is anticipated that by further perfection powerful electric currents may be produced cheap enough to perform the operations of manufacturing chemistry, thus far performed by batteries, the hydro-oxygen blow-pipe, by furnaces, or expensively chemical reaction, as acids, alkalies, etc. An inventor in London (not named in the report from which we borrow the following details) after having perfected a machine of the kind mentioned, driven by 2½ horse-power, and equivalent to 500 Bunsen cells, but costing only from 12 to 15 cents per day to run it, is now making another equal to 1000 such cells, by which he proposes to produce chemically pure copper, which is now worth from 3/4 to 1 pound at the cost of ordinary commercial copper; potassium and sodium at less than half their present price; aluminum, now at 75 per pound, at 30/ or 35/; and magnesium, calcium, and other rare metals at prices which will bring them into commercial use. The inventor of this machine has even the courage to declare that he will purify two tons of pig-iron from phosphorus, sulphur, carbon, and silica in eighteen or twenty minutes, at a saving of two-thirds of the coal. This latter point may be very doubtful, but every thing certainly tends to the probability of a glorious triumph in store for practical electrical science.

Comparative Cost of English and American Bessemer Steel.

A London correspondent of the Philadelphia Evening Telegraph says: It will be understood in a moment by readers of this letter, that a progressive increase in prices both of iron and of the mechanical skill necessary to puddle and convert it directly into useful forms, brings the English market so near the rates of the Pennsylvania, that you will need no prohibitive tariff to ensure that production shall be confined mainly to your own works. I learn on the highest authority in this country, that comparing accommodation of all kinds with accommodation in iron ships, a first-class vessel now costs exactly twice the sum that would have been required 10 years ago, and in 10 or 15 years more another advance of equal amount will have been made. A great social revolution is producing vast changes in our chief branches of industrial supremacy, so that now France, Sweden and Russia can build and equip sea-going vessels as cheaply and as well as the best of our great private yards on the Thames and the Mersey, the Humber and the Tyne. The United States are admitted to be yet a little in the rear, but the interval grows perceptibly and sensibly less every day. The second point is the change which is imminent in the materials of construction.

Bessemer steel, now largely worked up for various purposes in Pennsylvania, is being employed for the armoring of three first class war vessels in the French admiralty yards of Havre and L'Orient, and the adoption of steel, which has qualities that place it incomparably above iron, is mooted in the English yards. The principal difficulty in the way of its extensive use is that presented by the need for immediate, highly skilled supervision at every stage. To be dealt with fairly and with an approximate certainty of definite results, Bessemer steel plates must be annealed after punching, or the steel becomes for every purpose inferior to common iron. To insure this being done, an army of competent overseers, highly paid, must be had, and this necessarily, together with the fact that Bessemer steel is not so absolutely perfect when treated with the greatest care, points to an enormous increase in the cost of production of a large ship. It was quite illustrous for Mr. Bessemer to rise at one of the meetings of the naval architects to urge the perfection every way of the splendid material which steel has, under his care, become. The reply was not abstract in its nature, but concrete. Mr. Barnaby produced a steel plate struck on both sides to bend in opposite directions. The curvature was perfect in one instance, in the other there was a huge crack. A murmur of conviction that no argument could reverse ran through the crowded hall of the Society of Arts, where the Congress took place, on the exhibition of this proof of the applicability of the words "uncertain, and to some extent treacherous," to Bessemer steel.

Messrs. Hussey, Dravo & Co., of Pittsburgh, have leased the vacant lot at the south end of the Monongahela bridge, where they propose to erect a building and carry on the manufacture of steel castings.

Effect of Impurities in Copper.

Dr. Hampe has made some experiments for the purpose of determining the influence of foreign substances upon metallic copper. The following are some of his results, which differ essentially from what had been expected.

Suboxide of Copper.—The presence of 0.05 per cent. of oxygen, which corresponds to 0.45 per cent. of suboxide, does not cause any perceptible decrease of ductility of copper, but renders it much less tenacious; 0.1 per cent. of oxygen, equal to 0.9 per cent. of suboxide, has little effect in the cold and none at all when hot; 0.25 per cent. oxygen, equal to 2.25 per cent. suboxide, causes a perceptible decrease of ductility when cold, but it is always about equal to that of ordinary refined cast copper, so that it can be used for all purposes. Short-hot is not caused by this quantity, but takes place when 0.75 of oxygen, equal to 6.7 per cent. of suboxide, is present. In general, the suboxide has the effect of making copper cold-short rather than hot-short, while Karsten gives just the opposite opinion.

Sulphur, as sub-sulphide (not present as such in the refined metal), renders copper cold-short. The presence of 0.05 per cent. of sulphur renders the copper more ductile than ordinary refined copper; even with 0.25 per cent. of sulphur the copper is quite ductile, but with 0.5 per cent. of sulphur it is very short when cold, but not when hot, and very soft.

Arsenic and Arsenic Salts.—Arsenate of copper acts upon chemically pure copper like a foreign body, which mechanically loosens the composition of the molecule. With small quantities there is merely a decrease of tenacity; with larger quantities it becomes very cold-short, and finally, hot-short, too. The presence of 0.4 per cent., which corresponds to 0.1 per cent. arsenic and 0.08 per cent. oxygen, imparts to the copper the qualities of excellent refined copper; 2 per cent., or 0.55 per cent. of arsenic, makes it very cold-short and hard, also somewhat hot-short and unfit for use. After the reduction of the sub-arsenite of copper, the metal is essentially improved in quality, and is more tenacious. Hot-short does not take place with 0.5 per cent. arsenic, appearing first with 1 per cent., but then it is no longer cold-short—quite different from the previously received theory of the effect of arsenic.

The suboxide of copper is more sensitive to arsenic acid than to antimony acid, but an equal quantity of metallic antimony produces just as tenacious and ductile alloys as arsenic, and the limit for red-short is lower for antimony than for arsenic.

Lead.—The presence of 0.15 per cent. of lead in otherwise pure copper does not injure it, but rather renders it very ductile, without being hot-short; with 0.3 per cent. it becomes slightly hot-short, when rolled out very thin; with 0.4 per cent. and upward it is strongly hot-short and distinctly cold-short. The copper may be rolled out well enough, but is rotten, and breaks or scales when bent. If the quantity of lead exceeds a certain limit, the different alloys separate. This takes place in a marked degree in the presence of 1 per cent. of lead.

Bismuth, even in extremely small quantities, exerts a deleterious influence on the ductility, which is greater when hot than cold. With 0.05 per cent. of bismuth the copper is perceptibly cold-short and very hot-short; with 0.1 per cent. it is cold short, and at a bright red heat it crumbles. The simultaneous presence of antimony, along with the bismuth, considerably diminishes the injurious influence of the bismuth.

Over-toughened Copper.—When the operation of poling, which is employed for the purpose of toughening the copper, has been carried too far, it is sometimes hot-short and sometimes not. It is hot-short if it contains antimony or arsenite of lead or bismuth, which are reduced by over poling, while copper free from such salts is full of bubbles and imperfect when hammered out, but not hot-short.

If the influences above mentioned of foreign admixtures upon the properties of copper be used as guide for judging of the quality a given specimen of copper from its composition, as established by analysis, it will be found that the actual ductility is always considerably less, at least for ordinary temperatures, than its constitution would indicate. In judging of the quality of copper the specific gravity, as well as the chemical composition, must be taken into consideration more than has heretofore been done, for it stands in close relation to its strength.

Coke from Anthracite Coal.

W. Penrose and W. F. Richards, of Swansea, Wales, have received a patent for an invention relating to the production of coke. It consists in the mixing or incorporating of anthracite or stone coal, or free burning steam coal, or coal known as Staffordshire slack, or other non-coking coals, with bituminous coal, or any other coal capable of making coke, with pitch or tar, or with any form of tar or bitumen, mineral oils containing bitumen, petroleum, such coal or coals being in a state of division. The mixture thus produced is to be placed in any well known form of oven or retort commonly used for coking, and the surface is then to be covered with a layer of bituminous coal or other bituminous matter. In carrying out this invention the inventors cause the coals to be disintegrated, or ground, by any well known disintegrator, such as Carr's disintegrator, and to such disintegrated coals or mixture of the same—by preference in a moist condition—they add one or more of the above named ingredients, viz., pitch, tar, or any form of tar, bitumen, or mineral oils containing bitumen, petroleum, or

any of the waste products of petroleum, and they cause the same to be thoroughly mixed. When such mixture or incorporation has been effected, either by means of a disintegrator or pug-mill, or other incorporating apparatus, the minerals thus mixed are to be introduced into a convenient retort or any of the well known forms of coking ovens for the purpose of being converted into coke, and when placed in such oven or retort are to be covered with a layer of bituminous coal or matter, bituminous coal being preferred. The proportions in which the coals or mixtures of the same are to be employed, together with one or more of the before mentioned materials, will vary according to the quality of the coal or coals and the nature of the bituminous matter employed. They have found that good results may be obtained by employing from about sixty parts by weight of anthracite or stone coal of average good quality to about thirty-four parts by weight of bituminous or coking coal, and to about six parts by weight of pitch or ordinary coal tar. The layer of bituminous coal employed may vary from about 4 in. to 6 in. in depth, but, as we have before mentioned, these proportions and layers may be varied. This invention may be of especial interest to the owners of anthracite blast furnaces.

An interesting resume of the leading facts in early railway history will be found in the following extract from the late address of Thomas Allen, president of a Missouri railway, at St. Louis, viz.: One of the most remarkable things about this wonderful railway system is that its beginning is within the memory of those now in the prime of life. Whoever is curious upon the history of it should read Smiles' story of the Life of George Stephenson. Whoever would see the first locomotives, will find the French example in the *Conservateur des Arts et métiers*,¹ in Paris, and the English one still preserved in Kensington Museum, in London. It was only forty-five years ago that the first locomotive, drawing a train of cars, at a speed exceeding ten miles an hour, appeared upon the Liverpool and Manchester Railway line, in England. George Stephenson had worked upon it for fifteen years to bring it up to the imperfect state in which it appeared. Tramways were established from time immemorial, and they established the gauge of four feet eight and one-half inches, now the standard of American railways, which was simply the gauge of the ordinary road wagons, to which they were originally adapted. They were used at Quincy, in Massachusetts, in 1826, and at Mauch Chunk, in Pennsylvania, in 1827. But the first important line of railway was undertaken in this country by the Baltimore and Ohio, and opened fourteen miles, in 1828, and operated by horse-power. It is a disputed question, whether it was the first American locomotive, which appeared on this road, in 1830, built by Peter Cooper, New York, and ran from Baltimore to Ellicott's Mills, or whether it was a locomotive built by Governor Morris, of the West Point Works, which made its appearance on the Charleston and Hamburg Railroad of South Carolina. In 1833 this latter road was 136 miles long, and at that time the longest railway in the world. There is another question of some doubt, whether the first English locomotive in America, built by George Stephenson, appeared on the Baltimore and Ohio Railroad, or whether it was a little English locomotive, weighing six tons, which drew a train load of passengers on the Mohawk and Hudson Railroad, from Albany to Schenectady, in 1831. These movements in the construction of railroads in New York, Maryland, and North Carolina, were nearly simultaneous. A student, then in college, I had the honor of witnessing the coming of this first train, as I then supposed, in America, to the astonished sight of the people of Schenectady, including all the students of Union college, in 1831. The locomotive was a very crude affair, and the cars were simply stage coaches, set on frames. These forms of coaches were an imitation of the English style, which is continued in England to the present day, and they were continued on the New York lines some ten or more years later.

The "Menominee Furnace" blew out on the last day of April, for the purpose of repairing their stack. They blew in for the first time May 1, 1874, and have lost eight days, giving them 357 working days, in which time they have manufactured 7316 gross tons of iron, making a daily average of over 20 tons; manufactured from soft wood coal; two-thirds of coal made from slabs from our mills, and an average of 136 bushels of coal to the ton has been used. No furnace in the land can probably show as fine a record in the economy and successiveness of the manufacture, or the superiority of the iron as practically tested. The fact that the demand has been equal to the supply establishes the reputation it has acquired at home and abroad, and speaks volumes for those who have had the direct supervision of its production. Work will be resumed as soon as repairs are made.

The above extract is from the Menominee (Michigan) *Herald* of the 6th inst. This furnace is 44 feet high with nine feet four inches bosh. The result is wonderful, considering the fuel used; before the furnace was built the pine slabs were burned up by the mill companies. The furnace is owned by A. B. Meeker & Co., of Chicago, and is located on the shore of Green Bay, and connected by tracks with the Chicago and Northwestern Railway.

Special Notices.

MANUFACTURERS desirous of introducing their goods to the British and Continental Markets, are advised to insert advertisements in the newspaper "IRON," published every Saturday, at 99 Cannon Street, London, E. C.

SCALE: First 3 lines, 3/-; every additional line, 1d. Price, 6d. per copy, or 30, per annum, inclusive of postage to the United States.

Special Notices.

THE SIXTH
Cincinnati
Industrial
Exposition

Open for the reception of goods August 2, 1875. Opens to the public September 8th, and continues open until October 9th.

GRAND
16 DEPARTMENTS,
and an extended premium list in medals and gold coin.

Machinery Tested and Fully Reported upon.

Send for rules and premium list, and blank applications for space.

FRANK MILLWARD, Sec'y.

TENTH
Industrial
Exhibition

UNDER THE AUSPICES OF THE

Mechanics' Institute,
OF SAN FRANCISCO.

Manufacturers, Mechanics, and others, are advised that the above Exhibition will be opened in San Francisco on the 1st of August.

17th day of August

next, and will continue open at least one month. The Board of Managers invite all who desire to exhibit, to send in their application for space without delay to Mr. J. H. CULVER, Secretary, 27 Post St., San Francisco, who will promptly answer all inquiries.

700,000 PERSONS

from all parts of the Pacific visited the Exhibition of 1874, to see what could be learned or purchased in San Francisco and the United States.

San Francisco, with its population of one quarter of one million, is in intimate relations with Japan, China, Australia, Mexico, Hawaiian Islands, British Columbia, the various islands of the Pacific and contiguous domestic territory.

There is no charge of exhibiting, and power for driving machinery, etc., is furnished free.

By order of the Board of Managers.

A. S. HALLIDIE, Pres't.

Notice to Capitalists.

The Valuable Works and Property belonging to the Canadian Titanic Iron Company, Limited, at St. Urbain and Bay St. Paul, WILL be Sold by the Sheriff on the 18th of May next.

The Furnace, Tramway, Wharf, Buildings, &c., has cost nearly £80,000 sterling.

For particulars see the *Official Gazette* for the Province of Quebec, or apply to the undersigned.

E. H. Duval, Liquidator, C. T. I. Com. L'd.

April 16, 1875.

NOTICE.

We beg to inform the Hardware Trade that, as successors of the former agents of the Washoe Tool Mfg. Co., we hold the only stock of Washoe Picks in the market. If orders are addressed to us they will be filled promptly, as far as our stock permits, and at a liberal discount.

(Signed.) HOGAN & CLARKE.

Boston, May 18, 1875.

Wanted.

A partner with \$12,000 to \$30,000, to extend an established paying manufacturing business in the South. This will bear strict examination. Best references given and required.

Address, for particulars, D. W. M., Station H, New York City.

To Manufacturers.

Having established an Agency in Germany, we invite manufacturers to correspond with us regarding the introduction and sale of articles suitable for the European market. Address LAU & GARLICHES, 72 Beckman Street, New York.

DROP FORGINGS.

The TRENTON VISE & TOOL WORKS, Trenton, N. J., having increased their facilities, are now able to do all kinds of

Iron and Steel Drop Forgings

in quantities to order at reasonable rates.

HERMANN BOKER & CO., Proprietors, 101 & 103 Duane St., N. Y.

DISCOUNT LIST.

Iron Screws, Reviced Lists, 10% Discounts, &c., each. Files & Bolts, 5% to 10% to 20% to 25% each. Files & Bolts, 5% to 10% to 20% to 25% each. DAYTON & LAMBERTSON, 97 Chambers St., N. Y.

For Sale.

McHaffie Direct Steel Castings Co.
STEEL CASTINGS.

Solid and Homogeneous, guaranteed to stand a tensile strain of 26 tons per square inch. An invaluable substitute for expensive WROUGHT IRON FORGINGS or for Iron Castings, where great strength is required. Once, twice, three times as strong as Levant Steel.

PHILADELPHIA.

Send for Circular and Price List.

Wanted.

By an experienced man, a situation to superintend the Practical Department of a Rolling Mill. One who understands the getting up of fine grained iron, and all kinds of puddled iron for all purposes; also, Bessemer steel. Has had large experience in managing works in England. Is a practical iron worker. Refers to Mr. W. Gill, Managing Director Teeside Iron Works, Middlesboro', England; Mr. W. H. Brown, of the Stockhouse, Upper Town, Sheffield, England. Address RICHARD JONES, Care FOXELL & JONES, Troy, N. Y.

WANTED A Good Second-hand Roll Lathe

that will suit to turn 8 ft. 12 in. Rolls. Send description and price. Address

SHABER, JOHNSON & CO., Reading, Berks Co., Ind.

Special Notices.

MANUFACTURERS

desirous of introducing their goods to the British and Continental Markets, are advised to insert advertisements in the newspaper "IRON," published every Saturday, at 99 Cannon Street, London, E. C.

SCALE: First 3 lines, 3/-; every additional line, 1d.

Price, 6d. per copy, or 30, per annum, inclusive of postage to the United States.

Special Notices.

THE IRON AGE.

Effect of Impurities in Copper.

Dr. Hampe has made some experiments for the purpose of determining the influence of foreign substances upon metallic copper. The following are some of his results, which differ essentially from what had been expected.

Suboxide of Copper.—The presence of 0·05 per cent. of oxygen, which corresponds to 0·45 per cent. of suboxide, does not cause any perceptible decrease of ductility of copper, but renders it much less tenacious; 0·1 per cent. of oxygen, equal to 0·9 per cent. of suboxide, has little effect in the cold and none at all when hot; 0·25 per cent. oxygen, equal to 2·25 per cent. suboxide, causes a perceptible decrease of ductility when cold, but it is always about equal to that of ordinary refined cast copper, so that it can be used for all purposes. Short-hot is not caused by this quantity, but takes place when 0·75 of oxygen, equal to 6·7 per cent. of suboxide, is present. In general, the suboxide has the effect of making copper cold-short rather than hot-short, while Karsten gives just the opposite opinion.

Sulphur, as sub-sulphide (not present as such in the refined metal), renders copper cold-short. The presence of 0·05 per cent. of sulphur renders the copper more ductile than ordinary refined copper; even with 0·25 per cent. of sulphur the copper is quite ductile, but with 0·5 per cent. of sulphur it is very short when cold, but not when hot, and very soft.

Arsenic and Arsenic Salts.—Arsenate of copper acts upon chemically pure copper like a foreign body, which mechanically loosens the composition of the molecule. With small quantities there is merely a decrease of tenacity; with larger quantities it becomes very cold-short, and finally, hot-short, too. The presence of 0·4 per cent., which corresponds to 0·1 per cent. arsenic and 0·08 per cent. oxygen, imparts to the copper the qualities of excellent refined copper; 2 per cent., or 0·5 per cent. of arsenic, makes it very cold-short and hard, also somewhat hot-short and unfit for use. After the reduction of the sub-arsenite of copper, the metal is essentially improved in quality, and is more tenacious. Hot-short does not take place with 0·5 per cent. arsenic, appearing first with 1 per cent., but then it is no longer cold-short—quite different from the previously received theory of the effect of arsenic.

The suboxide of copper is more sensitive to arsenic acid than to antimony acid, but an equal quantity of metallic antimony produces just as tenacious and ductile alloys as arsenic, and the limit for red-short is lower for antimony than for arsenic.

Lead.—The presence of 0·15 per cent. of lead in otherwise pure copper does not injure it, but rather renders it very ductile, without being hot-short; with 0·3 per cent. it becomes slightly hot-short, when rolled out very thin; with 0·4 per cent. and upward it is strongly hot-short and distinctly cold-short. The copper may be rolled out well enough, but is rotten and breaks or scales when bent. If the quantity of lead exceeds a certain limit, the different alloys separate. This takes place in a marked degree in the presence of 1 per cent. of lead.

Bismuth, even in extremely small quantities, exerts a deleterious influence on the ductility, which is greater when hot than cold. With 0·05 per cent. of bismuth the copper is perceptibly cold-short and very hot-short; with 0·1 per cent. it is cold short, and at a bright red heat it crumbles. The simultaneous presence of antimony, along with the bismuth, considerably diminishes the injurious influence of the bismuth.

Over-toughened Copper.—When the operation of poling, which is employed for the purpose of toughening the copper, has been carried too far, it is sometimes hot-short and sometimes not. It is hot-short if it contains antimony or arsenite of lead or bismuth, which are reduced by over poling, while copper free from such salts is full of bubbles and imperfect when hammered out, but not hot-short.

If the influences above mentioned of foreign admixtures upon the properties of copper be used as a guide for judging of the quality a given specimen of copper from its composition, as established by analysis, it will be found that the actual ductility is always considerably less, at least for ordinary temperatures, than its constitution would indicate. In judging of the quality of copper the specific gravity, as well as the chemical composition, must be taken into consideration more than has heretofore been done, for it stands in close relation to its strength.

Coke from Anthracite Coal.

W. Penrose and W. F. Richards, of Swansea, Wales, have received a patent for an invention relating to the production of coke. It consists in the mixing or incorporating of anthracite or stone coal, or free burning steam coal, or coal known as Staffordshire slack, or other non-cooking coals, with bituminous coal, or any other coal capable of making coke, with pitch or tar, or with any form of tar or bitumen, mineral oils containing bitumen, petroleum, such coal or coals being in a state of division. The mixture thus produced is to be placed in any well known form of oven or retort commonly used for cokeing, and the surface is then to be covered with a layer of bituminous coal or other bituminous matter. In carrying out this invention the inventors cause the coals to be disintegrated, or ground, by any well known disintegrator, such as Carr's disintegrator, and to such disintegrated coals or mixture of the same—by preference in a moist condition—they add one or more of the above named ingredients, viz., pitch, tar, or any form of tar, bitumen, or mineral oils containing bitumen, petroleum, or

any of the waste products of petroleum, and they cause the same to be thoroughly mixed. When such mixture or incorporation has been effected, either by means of a disintegrator or pug-mill, or other incorporating apparatus, the minerals thus mixed are to be introduced into a convenient retort or any of the well known forms of coking ovens for the purpose of being converted into coke, and when placed in such oven or retort are to be covered with a layer of bituminous coal or matter, bituminous coal being preferred. The proportions in which the coals or mixtures of the same are to be employed, together with one or more of the before mentioned materials, will vary according to the quality of the coal or coals and the nature of the bituminous matter employed. They have found that good results may be obtained by employing from about sixty parts by weight of anthracite or stone coal of average good quality to about thirty-four parts by weight of bituminous or coking coal, and to about six parts by weight of pitch or ordinary coal tar. The layer of bituminous coal employed may vary from about 4 in. to 6 in. in depth, but, as we have before mentioned, these proportions and layers may be varied. This invention may be of especial interest to the owners of anthracite blast furnaces.

An interesting resume of the leading facts in early railway history will be found in the following extract from the late address of Thomas Allen, president of a Missouri railway, at St. Louis, viz.: One of the most remarkable things about this wonderful railway system is that its beginning is within the memory of those now in the prime of life. Whoever is curious upon the history of it should read Smiles' story of the Life of George Stephenson. Whoever would see the first locomotives, will find the French example in the *Conservatoire des Arts et Métiers*, in Paris, and the English one still preserved in Kensington Museum, in London. It was only forty-five years ago that the first locomotive, drawing a train of cars, at a speed exceeding ten miles an hour, appeared upon the Liverpool and Manchester Railway line, in England. George Stephenson had worked upon it for fifteen years to bring it up to the imperfect state in which it appeared. Tramways had existed from time immemorial, and they established the gauge of four feet eight and one-half inches, now the standard of American railways, which was simply the gauge of the ordinary road wagons, to which they were originally adapted. They were used at Quincy, in Massachusetts, in 1826, and at Mauch Chunk, in Pennsylvania, in 1827. But the first important line of railway was undertaken in this country by the Baltimore and Ohio, and opened fourteen miles, in 1830, and operated by horse-power. It is a disputed question, whether it was the first American locomotive, which appeared on this road, in 1830, built by Peter Cooper, New York, and ran from Baltimore to Ellicott's Mills, or whether it was a locomotive built by Governor Morris, of the West Point Works, which made its appearance on the Charleston and Hamburg Railroad of South Carolina. In 1833 this latter road was 136 miles long, and at that time the longest railway in the world. There is another question of some doubt, whether the first English locomotive in America, built by George Stephenson, appeared on the Baltimore and Ohio Railroad, or whether it was a little English locomotive, weighing six tons, which drew a train load of passengers on the Mohawk and Hudson Railroad, from Albany to Schenectady, in 1831. These movements in the construction of railroads in New York, Maryland, and North Carolina, were nearly simultaneous. A student, then in college, I had the honor of witnessing the coming of this first train, as I then supposed, in America, into the astonished sight of the people of Schenectady, including all the students of Union college, in 1831. The locomotive was a very crude affair, and the cars were simply straight coaches, set on frames. These forms of coaches were an imitation of the English style, which is continued in England to the present day, and they were continued on the New York lines some ten or more years later.

The "Menominee Furnace" blew out on the last day of April, for the purpose of repairing their stack. They blew in for the first time May 1, 1874, and have lost eight days, giving them 25 working days, in which time they have manufactured 7316 gross tons of iron, making a daily average of over 20 tons; manufactured from soft wood coal; two-thirds of coal made from slabs from our mills, and an average of 136 bushels of coal to the ton has been used. No furnace in the land can probably show as fine a record in the economy and successiveness of the manufacture, or the superiority of the iron as practically tested. The fact that the demand has been equal to the supply establishes the reputation it has acquired at home and abroad, and speaks volumes for those who have had the direct supervision of its production. Work will be resumed as soon as repairs are made.

The above extract is from the Menominee (Michigan) Herald of the 6th inst. This furnace is 44 feet high with nine feet four inches bosh. The result is wonderful, considering the fuel used; before the furnace was built the pine slabs were burned up by the mill companies. The furnace is owned by A. B. Meeker & Co., of Chicago, and is located on the shore of Green Bay, and connected by tracks with the Chicago and Northwestern Railway.

Special Notices.**MANUFACTURERS**

desirous of introducing their goods to the British and Continental Markets, are advised to insert advertisements in the newspaper "**IRON**," published every Saturday, at 99 Cannon Street, London, E. C.

SCALE: First 3 lines, 3¢; every additional line, 10¢. Price, 6d. per copy, or 30¢ per annum, inclusive of postage to the United States.

any of the waste products of petroleum, and they cause the same to be thoroughly mixed. When such mixture or incorporation has been effected, either by means of a disintegrator or pug-mill, or other incorporating apparatus, the minerals thus mixed are to be introduced into a convenient retort or any of the well known forms of coking ovens for the purpose of being converted into coke, and when placed in such oven or retort are to be covered with a layer of bituminous coal or matter, bituminous coal being preferred. The proportions in

Special Notices.**THE SIXTH
Cincinnati
Industrial
Exposition**

Opens for the reception of goods **August 2, 1875.** Open to the public **September 8th,** and continues open until **October 9th.**

**GRAND
16 DEPARTMENTS,**
and an extended premium list in medals and gold coin.
Machinery Tested and Fully Reported upon.

Send for rules and premium list, and blank applications for space.

FRANK MILLWARD, Sec'y.

**TENTH
Industrial
Exhibition**

UNDER THE AUSPICES OF THE

Mechanics' Institute,**OF SAN FRANCISCO.**

Manufacturers, Mechanics, and others, are advised that the above Exhibition will be opened in San Francisco on the

17th day of August

next, and will continue open at least one month. The Board of Managers invite all who desire to exhibit, to send in their application for space without delay to **MR. J. H. CULVER,** Secretary, 27 Post St., San Francisco, who will promptly answer all inquiries.

700,000 PERSONS

from all parts of the Pacific visited the Exhibition of 1874, to see what could be learned or purchased in San Francisco and the United States.

San Francisco, with its population of one quarter of one million, is in intimate relations with Japan, China, Australia, Mexico, Hawaiian Islands, British Columbia, the various islands of the Pacific and contiguous domestic territory.

There is a large market for shipping, and power for driving machinery, etc., is furnished free. By order of the Board of Managers.

A. S. HALLIDIE, Pres't.

Notice to Capitalists.**The Valuable Works and Property**

belonging to the Canadian Titanic Iron Company, Limited, at St. Urbain and Bay St. Paul,

Will be Sold by the Sheriff on the 18th of May next.

The Furnace, Tramway, Wharf, Buildings, &c., has cost nearly £80,000 sterling.

For particulars see the *Official Gazette* for the Province of Quebec, or apply to the undersigned.

E. H. DUVAL, Liquidator, C. T. I. Com. L'd.

April 16, 1875.

NOTICE.

We beg to inform the Hardware Trade that, as successors of the former agents of the Washoe Pickle Co., we hold the only stock of Washoe Pickles in the market. If orders are addressed to us they will be filled promptly, as far as our stock permits, and at a liberal discount.

(Signed.) HOGAN & CLARKE.

BOSTON, May 13, 1875.

Wanted.

A partner with \$12,000 to \$20,000, to extend an established paying manufacturing business in the South. This will bear strict examination. Best references given and required.

Address, for particulars, D. W. M., Station H, New York City.

To Manufacturers.

Having established an Agency in Germany, we invite manufacturers to correspond with us regarding the introduction and sale of articles suitable for the European market. Address

LAU & GARLICHES,

72 Beckman Street, New York.

DROP FORGINGS.

The TRENTON VISE & TOOL WORKS, Trenton, N. J., having increased their facilities, are now able to do all kinds of

Iron and Steel Drop Forgings

in quantities to order at reasonable rates.

HEMANN BOKER & CO., Proprietors, 101 & 103 Duane St., N. Y.

THE McHaffie Direct Steel Castings Co.

STEEL CASTINGS.

Solid and Homogeneous, guaranteed to stand a tensile strain of 25 tons per square inch. An invaluable substitute for expensive **WROUGHT IRON FORGINGS** or Iron Castings, where great strength is required. Office, 100 Broad St., Philadelphia.

Send for Circular and Price List.

Wanted.

By an experienced man, a situation to superintend the Practical Department of a Rolling Mill. One who understands the getting up of fine grained iron and all kinds of puddled iron for all purposes; also Bessemer steel. Has had large experience in managing works in England. Is a practical iron worker. Refers to Mr. W. Gill, Managing Director Teeside Iron Works, Middlesbrough, England; Mr. W. H. Brown, Blackhouse, Upper Teeside, England. Address RICHARD JONES, Care FOXELL & JONES, Troy, N. Y.

WANTED a Good Second-hand Roll Lathe

which will suit to turn 8 and 12 in. Rolls. Send description and price. Address

SHABER, JOHNSON & CO., Reading, Berks Co., Pa.

For Sale, Hardware Business

In successful operation since 1845. Rare opportunity to secure an old and established business. Stock of General Hardware, Iron, Nails, &c., will invoice \$6000 to \$8000. Two story brick business room, 25x30, with court in all, for \$1000. After first payment will make such terms as will be agreed upon, and pay to purchaser. Will assist purchaser at starting, if necessary. Satisfaction reasons for selling will be given.

Address G. U. RAYMOND, Cambridge City, Wayne Co., Ind.

For Sale, Hardware Business

In successful operation since 1845. Rare opportunity to secure an old and established business. Stock of General Hardware, Iron, Nails, &c., will invoice \$6000 to \$8000. Two story brick business room, 25x30, with court in all, for \$1000. After first payment will make such terms as will be agreed upon, and pay to purchaser. Will assist purchaser at starting, if necessary. Satisfaction reasons for selling will be given.

Address G. U. RAYMOND, Cambridge City, Wayne Co., Ind.

For Sale, Hardware Business

In successful operation since 1845. Rare opportunity to secure an old and established business. Stock of General Hardware, Iron, Nails, &c., will invoice \$6000 to \$8000. Two story brick business room, 25x30, with court in all, for \$1000. After first payment will make such terms as will be agreed upon, and pay to purchaser. Will assist purchaser at starting, if necessary. Satisfaction reasons for selling will be given.

Address G. U. RAYMOND, Cambridge City, Wayne Co., Ind.

For Sale, Hardware Business

In successful operation since 1845. Rare opportunity to secure an old and established business. Stock of General Hardware, Iron, Nails, &c., will invoice \$6000 to \$8000. Two story brick business room, 25x30, with court in all, for \$1000. After first payment will make such terms as will be agreed upon, and pay to purchaser. Will assist purchaser at starting, if necessary. Satisfaction reasons for selling will be given.

Address G. U. RAYMOND, Cambridge City, Wayne Co., Ind.

For Sale, Hardware Business

In successful operation since 1845. Rare opportunity to secure an old and established business. Stock of General Hardware, Iron, Nails, &c., will invoice \$6000 to \$8000. Two story brick business room, 25x30, with court in all, for \$1000. After first payment will make such terms as will be agreed upon, and pay to purchaser. Will assist purchaser at starting, if necessary. Satisfaction reasons for selling will be given.

Address G. U. RAYMOND, Cambridge City, Wayne Co., Ind.

For Sale, Hardware Business

In successful operation since 1845. Rare opportunity to secure an old and established business. Stock of General Hardware, Iron, Nails, &c., will invoice \$6000 to \$8000. Two story brick business room, 25x30, with court in all, for \$1000. After first payment will make such terms as will be agreed upon, and pay to purchaser. Will assist purchaser at starting, if necessary. Satisfaction reasons for selling will be given.

Address G. U. RAYMOND, Cambridge City, Wayne Co., Ind.

For Sale, Hardware Business

Trade Report.

Office of THE IRON AGE.

WEDNESDAY EVENING, May 19, 1875.

During the week under review little has transpired to vary the monotony of almost unusual dullness. In general trade but little of profitable activity is reported, and owing to the restricted demand for it, money remains easy and abundant. Borrowers on call are accommodated at 2 @ 8 per cent., and the discount rate on prime commercial paper is 4 @ 5 per cent.

The gold market has been strong, partly on account of heavy shipments and partly because of a movement to organize another clique to lock up gold and disturb things generally. Foreign exchange declined to \$4.87 @ \$4.90 for prime bankers' sterling. The following shows the daily range of the premiums:

	Highest.	Lowest.
Thursday.	115%	115%
Friday.	116%	115%
Saturday.	116%	115%
Monday.	116%	116%
Tuesday.	116%	115%
Wednesday.	116%	116%

Government bonds have been strong in sympathy with gold in this market, and steady in London. On Saturday the Secretary of the Treasury issued another call for \$5,000,000 of five-twentieths interest to cease August 1st, making \$35,000,000 in all of the new fives taken by the Syndicate. There is a good investment demand for railway mortgages at advancing prices. We give below the closing quotations of governments.

The stock market has experienced a sudden decline, and speculative shares are generally regarded with disfavor by those who have capital to risk in Wall street operations. The principal dealings have been in Lake Shore, Pacific Mall, Erie, Western Union, Rock Island and Union Pacific. We give below the highest and lowest of to-day's quotations for active shares.

The bank statement shows an increase in all items except circulation, which has fallen \$124,600. The following is a comparison of the averages for the last two weeks:

May 8.	May 15.	Differences.
Loans... \$283,450,800	\$285,216,901	Inc. \$1,796,100
Specie... 10,100,000	10,364,500	Inc. 364,500
Leg. Ten... 58,017,200	59,359,500	Inc. 1,342,300
Deposits... 227,873,900	228,921,300	Inc. 4,048,400
Circulation... 40,485,400	20,363,800	Dec. 194,600

The following tables show the foreign trade movements for the week:

IMPORTS.	1873.	1874.	1875.
Total for week... \$7,938,363	\$7,523,869	\$4,553,682	
Prev. reported... 163,325,177	151,226,213	132,184,684	

Since Jan. 1... \$171,183,440 \$158,750,089 \$136,735,046

Among the imports of general merchandise were articles valued as follows:

	Quant.	Value.
Anvils.....	.44	\$449
Brass goods.....	3	318
Bismuth.....	3	634
Bronzes.....	9	188
Chain and anchors.....	20	569
Copper.....	75	175
Cutlery.....	65	18,134
Guns.....	45	5,925
Hardware.....	31	2,445
Iron, pig, tons.....	316	10,664
Iron cotton ties.....	1,008	3,856
Iron, other, tons.....	151	11,274
Metal goods.....	241	21,219
Nails.....	11	738
Needles.....	1	6,709
Platina.....	1	224
Per. caps.....	10	2,066
Saddlery.....	4	980
Steel.....	3,045	32,219
Silverware.....	4	1,411
Tin, boxed.....	10,168	73,411
Tin, 1903 shds.....	135,326	96,378
Wire... 273	3,418	

EXPORTS, EXCLUSIVE OF SPECIE.

	1873.	1874.	1875.
For the week... \$3,482,894	\$6,604,654	\$4,106,551	
Prev. reported... 100,540,533	100,700,304	53,141,965	
Since Jan. 1... \$106,123,432	\$107,304,838	\$89,351,516	

EXPORTS OF SPECIE.

	1873.	1874.	1875.
Total for the week... \$2,223,115			
Previously reported... 98,533,684			
Total for the week... \$2,223,115			
Previously reported... 98,533,684			

Government bonds at the close were strong, with quotations as follows:

Bid.	Asked.
U. S. Currency 6%.....	124 1/2
U. S. 6s 1861, reg.....	129 1/2
U. S. 6s 1861, cou.....	134 1/2
U. S. 5-20 1862, cou.....	117
U. S. 5-20 1862, reg.....	117 1/2
U. S. 5-20 1864, con.....	118
U. S. 5-20 1865, reg.....	119 1/2
U. S. 5-20 1865, cou.....	130 1/2
U. S. 5-20 1865, reg. new.....	123 1/2
U. S. 5-20 1865, cou.....	122 1/2
U. S. 5-20 1865, reg. new.....	124 1/2
U. S. 5-20 1867, cou.....	121
U. S. 5-20 1868, reg.....	122
U. S. 5-20 1868, cou.....	123 1/2
U. S. 10-40 1868, reg.....	116 1/2
U. S. 10-40 cou.....	117 1/2
U. S. 5s 1861, reg.....	116 1/2
U. S. 5s 1861, cou.....	116 1/2

The following were the highest and lowest prices of stocks to-day:

	Highest.	Lowest.
N. Y. Cen. & Hudson Consolidated... 105 1/2	104 1/2	
Lake Shore... 68 1/2	66 1/2	
Rock Island... 103 1/2	102 1/2	
New Jersey Central... 116 1/2	115 1/2	
Michigan Central... 67 1/2	67 1/2	
Cleveland & Pittsburgh... 91 1/2	91 1/2	
Wabash... 10	8 1/2	
Western Union Telegraph... 77 1/2	76 1/2	
Atlantic and Pacific Telegraph... 25 1/2	24 1/2	
Northwestern... 89 1/2	88 1/2	
" Pref... 32	31 1/2	
Milwaukee & St. Paul... 36 1/2	35 1/2	
" Pref... 56 1/2	56 1/2	
Panama... 143	141	
Pacific Mail... 35 1/2	37 1/2	
Erie... 25 1/2	25 1/2	
Ohio & Mississippi... 35 1/2	35 1/2	
Missouri Pacific... 70 1/2	69 1/2	
Atlantic & Pacific Preferred... 15 1/2	15 1/2	
C. C. & Ind. Can... 54 1/2	5	

The following were the highest and lowest

prices of stocks to-day:

	Highest.	Lowest.
No. 2. Hard Maple Set—Eight mallets and balls, neatly painted with some slight defects; maple or lindenwood handles; two stakes; arches, book; etc. Complete in dovetailed box.....	31 1/2	
No. 3. Hard Maple Set—Eight concave-shaped mallets; eight selected maple balls; white ash and maple handles; stakes both painted with oil and varnish finish; fancy painted stakes; both eight colors; arches, etc. Complete in dovetailed case.....	32 1/2	
No. 4. Selected Hard Maple Set—Eight concave-shaped mallets; eight selected maple balls; white ash and maple handles; stakes both painted with oil and varnish finish; fancy painted stakes; both eight colors; arches, etc. Complete in selected dovetailed case.....	50 1/2	
No. 5. Selected Hard Maple Set—Eight fancy painted mallets; richly grained hickory, beautifully painted; eight choice rock maple balls; double striped; stakes both painted eight colors; a very handsomely painted and highly finished set; heavy arches; complete in selected dovetailed case.....	60 1/2	
No. 6. Apple Wood Set—Eight fancy turned apple wood mallets; eight choice selected maple balls; double striped; fancy stakes; heavy arches; handsomely painted and finished; complete dovetailed case with bronze trimmings.....	72 1/2	
No. 7. Apple Wood Set—Eight design mallets; club shape of apple wood, six inches long; eight choice selected maple balls; double striped; extra large fancy stakes; heavy arches; handsomely painted and finished; complete dovetailed case with bronze trimmings.....	73 1/2	

GENERAL HARDWARE.

Trade in General Hardware is not as active as it was a week ago. In the matter of prices there are no changes of importance to note.

The demand for Foreign Hardware shows no sign of improvement, and quotations of leading goods continue without change.

There is nothing new to report regarding the Nail market. The stocks in this city are in many instances broken, but the demand is not sufficient to allow this circumstance to have an enhancing influence as regards price. We continue to quote 10d., in lots of 200 kegs and

over, at 28-25, net, with no disposition on the part of holders to shade this figure for a large order. Small lots are quoted at \$3.35 @ \$3.40.

Trade in House Furnishing Goods, Timmers, Trimmings, &c., presents no new feature. The combination prices agreed upon by the manufacturers of Stamped and Re-tinned goods are, we are informed, adhered to, and we hear of no cutting in prices. The demand has fallen off during the past week.

The Stanley Rule and Level Company have introduced a new and greatly improved feature into Baily's Patent Block Plane No. 9½, as will be seen by reference to the engraving in their advertisement on page 26 of this paper. The Plane Iron is moved by means of a thumb screw, which admits of a nice adjustment than with a lever, as formerly used; and the eccentric movement given by a lever, which has tendency to slue the iron to one side, is dispensed with entirely. Plane No. 9½ is also adjusted in the same manner now; and the handle being secured to the stock by a nut, it can readily be removed or replaced at the convenience of the owner.

J. Clark, Wilson & Co. continue to act as New York agents for D. H. Whittemore, manufacturer of Coring, Paring and Slicing Machines, and all orders received from territory which can properly go to New York, will be executed by them. Prices for the coming sea-

son will be as follows, viz.:

Bay State Coring, Paring and Slicing Ma-

ing in the latter. European is still so much above the value of Domestic that the latter is taken in preference at the difference, but the general paralyzation in trade prevents briskness in the article. Sheet Zinc is also dull at 8½c. @ 8½c., gold.

ANTIMONY.—Forms an exception to the rule, and is rather firmer, although the business done in it might be brisker. The price at London is unchanged. We quote 13½c. @ 13c., gold, according to quantity.

COAL.

The Anthracite Coal trade still continues unchanged. There appears to be very little prospect of an early resumption of work. Men and operators are both determined to hold out, although miners show some weakness. A meeting of the representatives of the Associated Coal Companies who are now operating, will be held to-day for the purpose of fixing prices for the month of June. The wholesale dealers who have contracted with companies are asking \$7 @ \$7·50 for Stove, delivered here in carts; \$6 @ \$6·25 for Egg; \$5·50 @ \$5·55 for Chestnut; this is an advance over last season. The utilization of Coal Waste is increasing rapidly, and during the suspension of miners it has attracted the attention of many parties interested, and the mountains of stock at the mines will soon be turned to a good account by the Patent Fuel Company.

The inquiry for Bituminous has considerably increased, and prices are strengthening.

The Philadelphia *Ledger*, of Monday, 17th inst., says: "The total anthracite production reported for the week ending the 8th inst., was 298,337 tons, and for the year to the same date 3,930,033 tons, against 5,691,612 to the same time last year, showing a decrease of 1,761,579 tons. The Bituminous production reported for the week was 63,907 tons, and for the year 922,913 tons, against 881,897 tons to corresponding date last year, an increase of 41,016 tons. The total production of both kinds of Coal for the week was 362,244 tons, and for the year 4,852,946 tons, against 6,573,509 tons to corresponding time last year, showing a decrease in both kinds of 1,730,563 tons."

We quote as follows: Anthracite, \$4·60 @ \$5·60; Cumberland, \$6·50 @ \$7; West Virginia, \$7·50 @ \$8; James River Steam, \$6·25; James River Carbonite, \$9 @ \$9·50; Kanawha House, \$14·25; American Gas, \$7 @ \$7·25; American Cannel, \$12 @ \$14; Pennsylvania and Westmoreland, \$6·75; Murphy Run, \$7·40; Newburg Orel, \$7·50; Sterling, Ohio, \$13; Inca Hall, \$17 @ \$18; Liverpool House, Canal, \$17; Liverpool Gas, \$12; Newcastle Gas, \$7; Scotch, \$7·50 @ \$8.

The Coal transported over the Cumberland Branch Railroad during the week ending May 15, 1875, amounted to 7355 tons, as against 3465 tons shipped in the corresponding period of last year, showing an increase of 3890 tons. Over the Cumberland and Pennsylvania Railroad, for the same period, the shipments were 52,536 tons, against 51,804 tons shipped in 1874, an increase of 732 tons. The aggregate amount of Cumberland Coal shipped by the various companies so far this year amounts to 638,494 tons.

OLD METALS, PAPER STOCK, &c.

The sales of Old Metals have been better this week than for some time past, and dealers have materially reduced their stocks at the regular market prices. Paper stock is dull and declining. There is a fair demand for White Rage, and also for Grass Rope, but other articles are in little request. The purchasing offices of dealers are as follows:

Old Metals.—Copper, 16c. @ 17c. per lb.; Yellow Metal, 11c.; Brass, 10c. @ 12c.; Composition, heavy, 15c. @ 14c.; Lead, 5d.; Zinc, 5c.; Tin, Lead, 4½c.; Zinc, 4½c. @ 4½c.; Pewter, No. 1, 18c.; No. 2, 8c. @ 12c.; Spelter, 5c. @ 5½c.; Wrought Iron, 1½c.; Sheet do., 5c.; Cast, 5c.; Machinery, 1½c.;
Rags, &c.—Canvas Linen, 5c. @ 5½c.; do. Cotton, No. 1, 6c. @ 6½c.; No. 2, 2½c.; White, 1c.; No. 2, 4½c.; Colored, do., 2c. @ 2½c.; Mixed Woolen, 2c. @ 3c.; Soft do., bc. @ 5½c.; Gunny Bagging, 1½c.; Jute Butts, 1½c. @ 2c.; Kentucky Bagging, 3c.; Book Stock, 3c.; Waste Paper and Scraps, 1½c.; Kentucky Bale Rope, 4c.; Oakum Junk, No. 1, 4½c. @ 5c.; do. No. 2, 3c.; Tarred Shaking, 1c. @ 1½c.; Grass Rope, 2½c. @ 3c.

IMPORTATIONS.

Of Hardware, Iron, Steel and Metals into the Port of New York, for the week ending May 18, 1875:

Hardware.

Boker Hermann & Co. Per. caps, cs., 8 Mds., pkgs., 25 Barton, Alexander & Waller. Wire, cks., 1 Boot E. Filea, cks., 2 Brice & Cook. Wire, bds., 20 Blumenthal J. & A. Case, 1 Drexel, Morgan & Co. Ca-kas, 1 Cutlery, ca., 3 Frases, P. A. & Co. Wire, cks., 1 Field A. & Co. Package and chains, 36 Axvils, 27 Chains, 5 Hammers, cks., 1 Axvils, 50 Hecker P. S. Cases, 4 Laughland & Co. Wire, pkgs., 16 Mod. J. J. & Sons. Mds., pkgs., 2 Rosenthal J. S. & Co. Packages, 4 Sawyer John. Wire rope, reels, 9 Schoverling & Daly. Per. caps, cs., 8 Enamel Stridge co., cases, 7 Tome Francis & Co. Cases, 11 Van Wart & McCoy. Cases, 7 Guns, ca., 1 Anvils, 1 Weil, J. Cases, 11 Wilner W. J. Wire, ca., 1 Order. Files, cks., 12 Casks, 1

Iron.

Darrell & Co. Barrels, 11 Pieces, 51 Ferguson & Wood. Scrap, cks., 8 Scrap, lbs., 4120 Bentons, 1 Fir. tons, 59 Irwin H. & Co. Pig tons, 150

PITTSBURGH.

The Pittsburgh *Commercial* of May 15th says: There has been a little more inquiry for Pig Iron this week than for some time past, and the reports show an increased number of sales, but the price remains substantially the same as at date of our last report. We have heard of the sale of two or three lots of about 1000 tons each, at prices a little below quotations, but are without particulars, therefore cannot include them in our report. We also understand that Cleveland and Cincinnati parties have been buying and offering to buy Gray Forge Iron from the furnaces in the valleys, at \$33 to \$35·50, four months, on cars at furnaces, and that, at these figures, there is more Iron being sold each week than is being made; therefore, several of the furnace companies have withdrawn their Iron from this market for the present. We are reported the following sales:

BITUMINOUS COAL SMELTED FROM U. S. ORE.

400 tons gray forge..... \$24·00—4 mos.
400 tons gray forge..... 24·00—4 mos.
300 tons gray forge..... 24·00—4 mos.
250 tons gray forge..... 24·00—4 mos.
250 tons neutral..... 22·00—cash.
300 tons gray forge..... 23·00—cash.
160 tons white C. S. forge..... 21·00—4 mos.
160 tons gray forge..... 21·00—4 mos.
160 tons white mottled..... 22·00—4 mos.
100 tons white mottled..... 25·00—cash.
100 tons No. 1 foundry..... 23·00—cash.
65 tons gray forge..... 25·00—4 mos.
55 tons No. 2 foundry..... 27·00—4 mos.
90 tons No. 1 foundry..... 25·00—4 mos.
20 tons No. 2 foundry..... 25·00—4 mos.

CHARCOAL.

150 tons Nos. 1 and 2 foundry Hanging Rock..... \$30·00 @ 31·00—4 mos.
20 tons Eastern cold blast..... 38·00—4 mos.

ANTHRACITE.

150 tons close gray..... \$21·00—4 mos.

BLOOMS.

40 tons charcoal..... \$75·00—cash.

CLEVELAND.

Meissrs. C. E. BINGHAM & Co., 25 West Main street, under date of May 17, quote the Iron market as follows, 4 mos. time:

LAKE SUPERIOR CHARCOAL.

No. 1..... 32·00—4 m.
No. 2..... 32·00—4 m.
No. 3..... 23·50—4 m.
No. 4..... 34·00—4 m.
Nos. 5 and 6..... 35·00—4 m.

BITUMINOUS FOUNDRY.

No. 1 Foundry..... \$20·50—4 m.
No. 2 Foundry..... 28·00—4 m.
No. 1 Gray Forge..... 26·00—4 m.

AMERICAN SCOTCH.

No. 1, Cherry Valley..... \$32·00—4 m.
No. 2..... 28·00—4 m.

MASILLON.

Masillon No. 1..... \$31·50—4 m.
B-1..... 29·50—4 m.
Masillon No. 2..... 27·00—4 m.

BOSTON.

BOSTON, May 15.—Pig is unchanged in any feature, unless it might be considered that there is a more general solicitation of offers and orders was an item to note. The sales are exceedingly trivial, being confined to the wants of small foundries, and from them the business is of a hand-to-mouth character. Quotations again begin to show considerable variety. Certain popular brands hold their range very strong from principle, but then most everybody has "something to show that might answer just as well at \$3 less or so." The market is neither strong nor weak, but holds a nominally steady position, possibly more disposed to meet buyers' views than a week ago. This has had its effect on scrap and old stock. We quote on wharves No. 1, \$29 to \$33; No. 2, \$23 to \$28, and Gray Forge, \$22 to \$27, the outside ranges to be stated as above the market. New York advises a spirit of concession there of 50¢ a ton on 100 ton lots. This is for lots in yard. On the few brands not in stock prices are strong for future delivery. We quote Hoboken, \$27 to \$29; No. 1, \$24 to \$28; No. 2, and \$22 to \$26. Gray Forge. Bar is having a fair and steady jobbing trade, with a much better feeling among jobbers and consumers. The stocks generally are light, with the mills nearly all over a month behind now on orders. This is especially the case from Pittsburgh, whence advice has been received of inability to meet a demand of certain specific sizes before July. The reports from Ohio are of a similar tenor. This does not refer to common iron, but to refined. The market here is strong at \$60. Special small sizes in large lots bring \$5 more. Common Iron is low at \$54 to \$56. Steel continues to sell quite readily in the hands of machinists and tool makers. The inquiry is in the highest grades generally, which are selling quite low through competition. Our quotation of Sweet's Excelsior Tire, a favorable brand with New England carriage builders, is the price named at the mill in Syracuse. We quote American Tool 15c. to 15½c.; American Machinery, 9½c. to 10c.; do., Tires at 6½c. to 7c.; Sweet's Excelsior Tire, 15c.; English Tool, 16c. to 17c.; Com. Bulletins.

IMPORTATIONS.

The sales of Old Metals have been better this week than for some time past, and dealers have materially reduced their stocks at the regular market prices. Paper stock is dull and declining. There is a fair demand for White Rage, and also for Grass Rope, but other articles are in little request. The purchasing offices of dealers are as follows:

Old Metals.—Copper, 16c. @ 17c. per lb.; Yellow Metal, 11c.; Brass, 10c. @ 12c.; Composition, heavy, 15c. @ 14c.; Lead, 5d.; Zinc, 5c.; Tin, Lead, 4½c.; Zinc, 4½c. @ 4½c.; Pewter, No. 1, 18c.; No. 2, 8c. @ 12c.; Spelter, 5c. @ 5½c.; Wrought Iron, 1½c.; Sheet do., 5c.; Cast, 5c.; Machinery, 1½c.;
Rags, &c.—Canvas Linen, 5c. @ 5½c.; do. Cotton, No. 1, 6c. @ 6½c.; No. 2, 2½c.; White, 1c.; No. 2, 4½c.; Colored, do., 2c. @ 2½c.; Mixed Woolen, 2c. @ 3c.; Soft do., bc. @ 5½c.; Gunny Bagging, 1½c.; Jute Butts, 1½c. @ 2c.; Kentucky Bagging, 3c.; Book Stock, 3c.; Waste Paper and Scraps, 1½c.; Kentucky Bale Rope, 4c.; Oakum Junk, No. 1, 4½c. @ 5c.; do. No. 2, 3c.; Tarred Shaking, 1c. @ 1½c.; Grass Rope, 2½c. @ 3c.

FOREIGN.

FRANCE.

Moniteur des Intérêts Matériels.

PARIS, May 2, 1875.—Metals.—Disquieting rumors exist between the western governments of the Continent are gradually being dispelled, and as the dispute between capital and labor in South Wales is also apparently on the eve of settlement, there seems to be no obstacle in the way of a revival in the European metal trade. Railway earnings have been all that could be expected, and the coal market is active both in England and on the Continent, and in spite of the complaints about dullness in trade, the situation is in reality a sounder one than would appear at a superficial glance. Interested parties have represented the actual state of affairs as being a great deal worse than it is, and this related more particularly to copper, a dependent market being made once more by operators for failure to develop the metal by all sorts of statistical arguments specially got up to serve the purpose to be attained. No new feature is, however, arisen with regard to this metal, which remains in a strong attitude, nevertheless, much to the disappointment of the parties that predicted \$73 for Chili Bar but a short time ago. Copper is at \$17·50 per ton, and the following rates are deliverable at Bayreuth: Chili Bar, 21·75 francs; Common do., 20·75; Ingots, 22·00. White and Mottled..... 20·00 @ 22·00.

CINCINNATI.

Meissrs. L. R. HULL & Co., under date of May 17, write us as follows: Pig Iron.—The market remains quiet, with an inclination to ease off on prices. The hopes of an improvement in business during the next few months will probably not be realized, and the outlook at present hardly promises much improvement before fall. Mill Irons are in better supply, and the anticipation of higher prices have not been realized. We quote:

HOT BLAST CHARCOAL.

Hanging Rock No. 1, \$10 ton..... \$28·00 @ 29·00—4 mos.
No. 2..... 28·00 @ 27·00—4 mos.

HOT BLAST STONE COAL AND COKE.

No. 1 F'dry, from Hanging Rock Ores..... 27·00 @ 28·00
" 2 " " " 25·00 @ 26·00
" 1 Mill, " " " 24·00 @ 25·00
" F'dry, from Alabama, Georgia and Tennessee Ores..... 26·00 @ 27·00
" 2 F'dry, from Alabama, Georgia and Tennessee Ores..... 25·00 @ 26·00
" 1 Mill, from Alabama, Georgia and Tennessee Ores..... 24·00 @ 25·00
No. 1 F'dry, from Missouri Ores..... 25·00 @ 26·00
" 2 " " " 27·00 @ 28·00
" 1 Mill, " " " 27·00 @ 28·00

COLD BLAST CHARCOAL.

Car Wheel from Hanging Rock Ores..... 40·00 @ 50·00
" Tennessee Ores..... 33·00 @ 37·00
" Alabama and Georgia Ores..... 38·00 @ 40·00
Car Wheel from Kentucky Ores..... 30·00 @ 42·00

ST. LOUIS.

The Pittsburgh *Commercial* of May 15th says: There has been a little more inquiry for Pig Iron this week than for some time past, and the reports show an increased number of sales, but the price remains substantially the same as at date of our last report. We have heard of the sale of two or three lots of about 1000 tons each, at prices a little below quotations, but are without particulars, therefore cannot include them in our report. We also understand that Cleveland and Cincinnati parties have been buying and offering to buy Gray Forge Iron from the furnaces in the valleys, at \$33 to \$35·50, four months, on cars at furnaces, and that, at these figures, there is more Iron being sold each week than is being made; therefore, several of the furnace companies have withdrawn their Iron from this market for the present. We are reported the following sales:

HOT BLAST STONE COAL AND COKE.

No. 1 F'dry, from Hanging Rock Ores..... 27·00 @ 28·00
" 2 " " " 25·00 @ 26·00
" 1 Mill, " " " 24·00 @ 25·00
" F'dry, from Alabama, Georgia and Tennessee Ores..... 26·00 @ 27·00
" 2 F'dry, from Alabama, Georgia and Tennessee Ores..... 25·00 @ 26·00
" 1 Mill, from Alabama, Georgia and Tennessee Ores..... 24·00 @ 25·00
No. 1 F'dry, from Missouri Ores..... 25·00 @ 26·00
" 2 " " " 27·00 @ 28·00
" 1 Mill, " " " 27·00 @ 28·00

COLD BLAST CHARCOAL.

Car Wheel from Hanging Rock Ores..... 40·00 @ 50·00
" Tennessee Ores..... 33·00 @ 37·00
" Alabama and Georgia Ores..... 38·00 @ 40·00
Car Wheel from Kentucky Ores..... 30·00 @ 42·00

BRUSSELS.

BRUSSELS, May 2, 1875.—Iron.—The Iron trade of Belgium remains in an uncomfortable plight, despite the efforts of producers and manufacturers to extend their field of operations by creating new markets. Although we are ready to sell low, orders are not easily procured. In fact, the current market tends will hold out for 200 railroad cars. These orders for the supplying of the State railway lines are real cash in hand, while the manufacturers are willing to offer what they can get. The Belgian metallurgical exchanges have been well attended during the week, but as for actual business transacted, there is little to be reported. Coal has been more active and steadier, our sugar refineries having begun to lay in for the winter. Our own government will also soon be in the market once more for 100 to 200 railcars. The Belgian metallurgical exchanges have been well attended during the week, but as for actual business transacted, there is little to be reported. Coal has been more active and steady, our sugar refineries having begun to lay in for the winter. Our own government will also soon be in the market once more for 100 to 200 railcars. The Belgian metallurgical exchanges have been well attended during the week, but as for actual business transacted, there is little to be reported. Coal has been more active and steady, our sugar refineries having begun to lay in for the winter. Our own government will also soon be in the market once more for 100 to 200 railcars. The Belgian metallurgical exchanges have been well attended during the week, but as for actual business transacted, there is little to be reported. Coal has been more active and steady, our sugar refineries having begun to lay in for the winter. Our own government will also soon be in the market once more for 100 to 200 railcars. The Belgian metallurgical exchanges have been well attended during the week, but as for actual business transacted

stages of the reduction, however probable it may appear. French chemists, indeed, have denied the possibility of this carbon deposit escaping oxidation during its passage through the furnace.

The sources of unbalanced absorption of heat in this great lower, or melting, region are the fusion of pig iron, the fusion of slag, and the reduction of phosphorus, sulphur and silicon. For the fusion of pig, Bell and Gruner agree in requiring an expenditure of 330 calories per unit of weight; or, adopting Mr. Bell's convenient expression, 6600 cwt. units per ton of pig. For slag fusion (on an average charge) 14,000 to 16,720 cwt. units. For reduction of P, S, and Si (also on average), 4200 to 3400 cwt. units per ton of pig. The general sources of loss of heat, such as by radiation, by tuyere water, and other incidental losses, on the same authority, equal, per ton, about 5400 cwt. units or 770 units per unit of weight. The heat lost in dissociation of H₂O in blast is probably balanced by its subsequent recombination. The loss by waste gases, again, is too variable for estimation, but may be generally set off against that introduced by a moderately heated blast.

London Metal Market.

(From The Mining Journal.)

	E.	S.	d.	A.	S.	d.
Best Selected.....	88	0	0	89	—	—
Tough Cake & Tile.....	87	0	0	—	—	—
Sheathing and Sheets.....	91	10	0	92	10	—
Bolts.....	95	0	0	95	0	0
Bottoms.....	95	0	0	95	0	0
Old.....	89	0	0	83	—	—
Australian Wallaroo.....	90	10	0	91	10	—
" other brands.....	98	0	0	98	0	0
Chili bars, g. o. b.....	81	10	0	82	10	0
Wire.....	98	0	1	—	—	—
Tubes.....	98	0	1	X	—	—
Brass—# 10.						
Sheets.....	0	0	94	0	0	104
Wire.....	0	0	94	0	0	—
Tubes.....	0	0	12	0	0	124
Yellow Metal Sheathing.....	0	0	74	0	0	74
Sheets.....	0	0	74	0	0	74
Spelter—# 10.						
Foreign on the spot.....	21	16	0	23	11	0
" to arrive.....	22	17	0	23	—	—
Zinc—# ton.						
In Sheets.....	29	10	0	—	—	—
Quicksilver—# bottle.	15	0	0	—	—	—
English Blocks.....	91	0	0	—	—	—
Ditto Bars (in brick).....	92	0	0	—	—	—
Banks.....	93	0	0	—	—	—
Struts.....	84	10	0	—	—	—
Australians.....	98	0	0	84	—	—
Iron—# ton.						
Bars Welsh, in London.....	81	15	0	8	15	0
Nail Rods.....	8	3	0	8	15	0
Nail Rods, Staff'd in London.....	9	10	0	9	15	0
Bars.....	10	0	0	11	0	0
Hoops.....	11	0	0	11	0	0
Hoops Gtto.....	9	10	0	11	0	0
Sheets, single, and plates.....	12	0	0	11	10	0
Pig. No. 1, in plate.....	12	0	0	12	0	0
Sheets, metal and iron.....	12	0	0	12	0	0
Bars, common ditto.....	12	0	0	8	0	0
Do, merchant, Tyre or Tees.....	8	0	0	8	0	0
Ditto, Railways in Wales.....	16	0	0	17	0	0
To arrive.....	17	0	0	17	0	0
Pig. No. 1, in Clyde.....	3	12	0	4	17	0
Ditto, f.o.b., Tyre or Tees.....	4	0	0	4	0	0
Ditto, New York.....	5	0	0	5	0	0
Bailey Chairs.....	5	0	0	5	0	0
" Spikes.....	12	10	0	14	0	0
Indian Ch'cos Pigs in L'don	0	0	0	0	0	0
Sweden, in kgs (rolled).....	10	0	0	20	0	0
Ditto, (hammered).....	19	0	0	24	0	0
Ditto, in faggots.....	19	0	0	24	0	0
End splices.....	19	0	0	—	—	—
Lead—# ton.						
English Pig, common.....	21	10	0	—	—	—
Ditto, L.P.	21	10	0	—	—	—
Ditto, Sheet.....	22	10	0	—	—	—
Ditto, Red Lead.....	24	0	0	32	0	0
Ditto, White.....	25	0	0	32	0	0
Ditto, Small.....	21	0	0	—	—	—
Spainish.....	21	0	0	—	—	—
* At the works, 1s. to 1s. 6d. per ton less. Terne plates 2s. per box below tin plates of similar brands.						
+ Add 4s. for each X.						



A Family Necessity.

THE CELEBRATED

SUMMER KING COOK STOVES.

Burns Kerosene Oil, without smoke or smell, at a cost of one cent per hour. Bakes, Roasts, Fries, Broils, and does every manner of cooking in the most superior manner. Heats a house in 12 minutes. Guaranteed not to smoke, smell or explode. Circular seal to any address.

F. H. THORP, Manufacturer,
138 Chambers St., N. Y.

Discount to clergymen and the trade.

FLUTING MACHINES.

The Celebrated K. F. M.

Manufactured for the Trade by

HENRY SOMMER,

8 to 19 Pearl Street, NEWARK, N. J.

COLEMAN & BRO.

Manufacturers' Agents and Brokers

PIG IRON, NAILS, RAILS, NUTS,

WASHERS, and General

Railroad Supplies. LOUISVILLE, KY.

Established in 1836.

Shelton Company,

Manufacturers of every variety of

TACKS & SMALL NAILS,

Carriage, Machine, Plow, Stove and

Tire Bolts, Coach Screws,

Bed Screws, &c.

BIRMINGHAM, CONN.

SPRAGUE SASH WEIGHT CO.,

YOUNGSTOWN, OHIO,

Manufacturers of

SPRAGUE'S IMPROVED

Sectional Sash Weights.

Orders solicited from all parts of the country



Established in 1839.

A. G. COES & CO.

WORCESTER,
Mass.,

Manufacturers of

THE GENUINE

COES'

SCREW WRENCHES.

Our goods have been very much improved recently by making the Bar WIDE, as shown in the cut, which makes a 12 in. Wrench as strong as a 15 in. made in the ordinary way.

A. G. COES'
NEW PATENT
FERRULE

Which cannot be forced back into the handle.

Our goods are manufactured under Patents dated Feb. 26, 1870, Mar. 2, 1871, and Dec. 26, 1871, and any violation of either will be rigorously prosecuted.

We call particular attention to our new Patent Ferrule, with its Supporting Nut (shown in section in the above cut), which makes the strongest Ferrule fastening known.

A. G. COES & CO.

Schweitzer Mfg. Co.,
57 Reade Street, New York.

MANUFACTURERS OF

Continental Locks.

Excelsior Dividers.

Excelsior Calipers.

Axes of the celebrated brands:

"Queen of the Forest,"

"Wood Choppers' Pride."

Wetmore's Hatchets.

Tackle Blocks.

Brad Awls and Tools, (in sets).

SOLE AGENTS FOR

Newbold's Files, Chisels, Plane Irons and Tools.

Baldwin's Solid Cast Steel Carpenters' Hammers, Mining and Blacksmiths' Sledges and Tools.

Davis Level and Tool Co.'s celebrated Patent Adjustable Plumbs and Levels and Inclinometers.

Improved Iron Bench Planes and other Tools.

Chapin Machine Co.'s Boring Machines.

Humphrey & Bartlett's Horse Brushes.

H. Chapin's Son's Rules, Planes, Gauges, Plumbs and Levels, Try Squares, T Bevels, Hand Screws, &c.

IMPORTERS OF

Stubs' Files.

French Coffee Mills, and General Hardware and Cutlery.

A complete and extensive stock always in store.

Catalogues mailed on application.

R. J. BRITTAINE,
Manufacturer of

TELEGRAPHIC INSTRUMENTS,

Burglar Alarms, Bell Bells, &c.

NICKEL PLATING DONE TO ORDER.

118 Bergen St., Newark, N. J.

N. B.—A Specialty made of Experimental work.

Stretches the wire each way, is tightened with a common wrench, is self-fastening at each half turn, for strength and durability. Sold at hardware stores, mercantile establishments, ironmongers, &c. Manufactured at Rockelle, Illinois.

Agents: Hibbard & Spencer, Chicago; Excelsior Mfg. Co., St. Louis; John Nazro & Co., Milwaukee; George Trich, Denver; Nelson & Co., Burlington, Iowa.

EMPIRE PORTABLE FORGES

NO BELTS, BELLOWS OR CRANKS

The Best Made.</p



Prices Reduced for Little Joker, STANDARD, Paragon, Tycoon & Whitney's Revolvers.

ILLUSTRATED CATALOGUE of

GUNS, RIFLES, PISTOLS, MATERIAL,

Shooting Tackle, &c., furnished to DEALERS only.

P. O. Box 5380. SCHOVERLING & DALY, 84 and 86 Chambers Street, N. Y.



HERCULES IRON CUTTER.

No. 1, weight 16 lbs., cuts $\frac{3}{4} \times 2$ inch, or $\frac{1}{2}$ inch round or square.... Price \$25.00
No. 2, " 165 " $\frac{3}{4} \times 3$ " 50.00
No. 3, " 350 " $\frac{3}{4} \times 4$ " 75.00

This is by far the most powerful Iron Cutter in use which can be worked by hand, having three times the capacity of any other machine which sells at the same price. The No. 3 machine occupies a space of 12x30 inches; when in use additional space must be had for the lever to work in. We send two sets of knives with each machine, one set being made of steel, the other of cast iron and steel. By using the knives adapted to it, round iron is cut without being flattened. One man can cut the largest size iron named above, but two would be required for steady work. It does not take a minute to change the knives or to shift the machine from large to small sizes.

MILLERS FALLS CO.—Enclosed find draft for amount of \$100,000, January 7. We would have sent the amount before, but did not have an opportunity of trying the Iron Cutter until a few days ago. It is one of the best machines we ever saw.

Yours truly,
H. L. PRATT, President.

Office of the ATHENS FOUNDRY AND MACHINE WORKS, ATHENS, GA., February 18, 1875.

H. L. PRATT, President.—Dear Sir: Enclosed find draft made payable to you for your order by Messrs. Childs, Nickerson & Co., in payment for Iron Cutter. We have put our Cutter to good service, and find it cuts readily 1½ round, and $\frac{3}{4} \times \frac{1}{2}$ square iron. C. N. & Co. are pleased with theirs, say it will save many a blow and cold chisel in their iron house.

Truly yours,
R. NICKERSON, Agent.

We make a satisfactory discount to dealers, and warrant the cutters to do all which we claim for them. Send for prices.

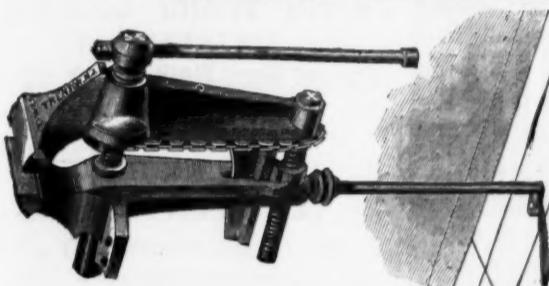
Millers Falls Company,

No. 78 Beekman Street, New York,

Sole Proprietors and Manufacturers of the

Barber Self-Fitting Bit Braces, Millers Falls Vises, Improved Angular and Ratchet Drilling Machines, TUBE SCRAPERS, FAMILY TOOL CHESTS, Patent Adjustable Tool Holders, Mitre Boxes, Ratchet Braces, Breast Drills, etc.

The New Double Screw Parallel "Leg" Vise.



We are now ready to furnish, as the result of more than thirty years' experience, our latest style of Vise—the best yet made. It is stronger than any other, whether of Foreign or of American make; always parallel and holding with a tighter "grip." The jaws are of coppered steel, and are made to hold the work in any position, either sliding or rotating, instead of the heavy, clumsy former jaws of the cast iron Single Screw Vise of the common "parallel" type, and which, depending upon slides alone for preserving parallelism, can never be screwed up very hard without "jamming" on the sides or breaking.

The new Vise is made of the best Tool Cast Steel, welded on, file-cut and properly hardened. The screw is made of the best steel, and is perfectly true.

The lower screw maintains the parallel position of the two jaws, by having exact motion with the upper working screw through the connecting chain which regulates it.

The chain is very accurately made of steamed links and rivets, and having no strain of the work upon it, is therefore as durable as all the other parts.

Prices with Special Discounts to the Trade.

No. 1. Jaws $\frac{3}{4}$ in. x $\frac{3}{4}$ in. Screws $\frac{3}{4}$ in. diameter. Lever 9 in. long. Opens $\frac{4}{5}$ in.	\$8.00
" 2, " $\frac{3}{4}$ in. x 1 in. " 1½ in. " 15 in. " 12 in.	12.00
" 3, " $\frac{5}{8}$ in. x $\frac{3}{4}$ in. " 1½ in. " 16 in. " 17 in.	17.00
" 4, " $\frac{6}{8}$ in. x $\frac{3}{4}$ in. " 1½ in. " 19 in. " 22 in.	22.00
" 5, " $\frac{7}{8}$ in. x $\frac{3}{4}$ in. " 1½ in. " 20 in. " 24 in.	24.00
" 6, " $\frac{8}{8}$ in. x $\frac{3}{4}$ in. " 1½ in. " 26 in. " 34 in.	34.00

All sizes of these Vises furnished with Swivel Attachment, at an additional cost of \$1 to \$3. Sold at the General Agencies.

THESE GOODS ARE SOLD BY THE GENERAL AGENTS (with special discounts to the trade).

New York.—Messrs. J. CLARK WILSON & CO.—RUSSELL & ERWIN MANUFACTURING COMPANY.—Messrs. HORACE DURRIE & CO., Boston.—Messrs. GEORGE H. GRAY & DANFORTH, Philadelphia.—Messrs. JAMES C. HAND & CO., Baltimore.—Mr. W. H. COLE.

PATENT BOLT HEADER

Manufactured by

WILLIAM GARDNER'S SONS,
575 Grand Street, N. Y.

Having investigated the comparative merits of this and all other machines, we can recommend it as the best Bolt Header ever made.

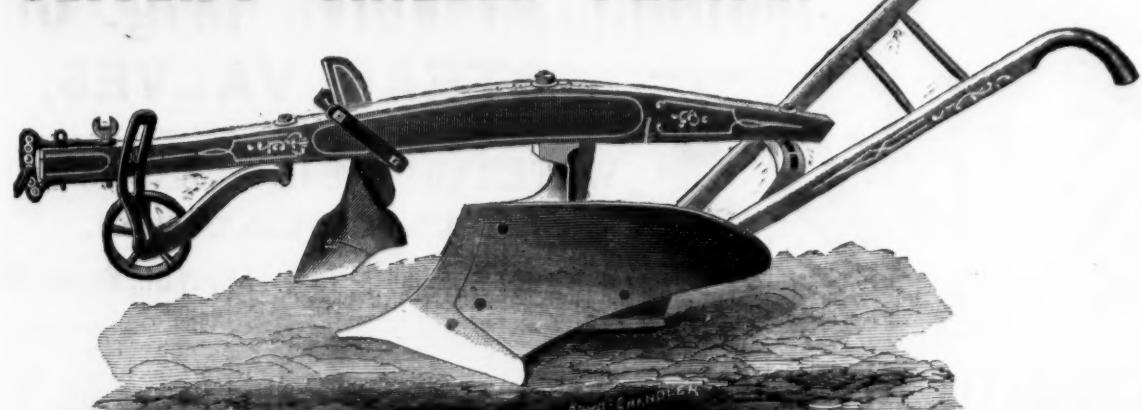
It will command itself for simplicity, durability, quality and quantity of work over all others. It will make perfect Square or Hexagon Bolts, in from 3 to 5 revolutions, and runs at the rate of one hundred and twenty revolutions per minute. Plough, Track, Button-head Bolts, and all similar heads are made with one revolution.

To show that it will stand the test of long continued strain, it has made eleven tons of half-inch Bolts from one-and-a-quarter to two-and-one-half inches long; eighteen tons five-eighth Bolts; twenty-six tons three-quarter Bolts, and thirty-seven tons seven-eighth Bolts, by one set of dies for each size, without change or repairs. It makes and cuts off the bolt from the heated bar, from one to ten inches, or of any greater length cut for the purpose, and either round or square iron may be used.

ANY STYLE OF HEAD CAN BE MADE, INCLUDING

Square, Hexagon, T, Button, Countersunk, Cone, Plough and Track Bolts, &c., &c.

OLIVER'S CHILLED PLOWS.



These implements, though but four years before the public in their present form, show the following remarkable record:

1506 were sold in the season of 1871. 7472 were sold in the season of 1873. 30,000 will be made for the season of 1875.

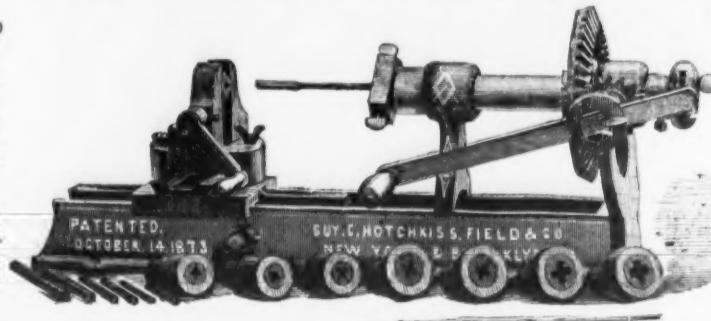
3049 " 1872. 14,976 " 1874. For full descriptive circulars, address,

SOUTH BEND IRON WORKS, South Bend, Ind.

Guy C. Hotchkiss, Field & Co..

85 First St., Brooklyn, E. D., and New York City.

" Champion" Thread Cutting



and Nut Tracing Machine.

This machine has revolving and sliding jams, which enables the operator to cut all kinds work, no matter how irregular in shape it may be. It cuts a perfect thread at once going over. As much work can be done in one hour by this machine as in a day with stocks and dies. Send for Circular.

Manufacture Carriage Materials, Axles, Springs, Blacksmiths' Supplies, Bolts, Wood Work, Trimmings, &c.

IMPORTERS AND DEALERS IN

IRON AND STEEL.



CRUCIBLES FOR MELTING ALL KINDS OF METALS.

And Manufacturers of

Sunny Side Stove Polish.

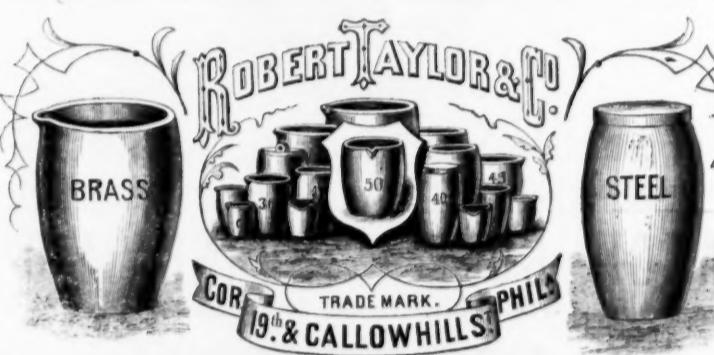
Lumber Pencils, Foundry Facings and Lubricating Plumbago.

STROW, WILE & CO.,

Nos. 1324, 1326, 1328, 1330, 1332 & 1334 Callowhill St., Phila.

GENERAL AGENTS:

Messrs. HALL & CARPENTER, 709 Market St., Phila.



BLACK LEAD CRUCIBLES

of all Sizes and Forms for melting

Steel, Brass, Gold, Nickel and all kinds of Metals.

Mr. Robert Taylor, who was for seven years the head of the late firm of Taylor, Strow & Co., and who is a practical mechanic, and familiar with all the details of the manufacture of Crucibles, attends personally to our manufacturing department. We would, therefore, respectfully solicit a continuance of the favors hitherto extended to him.

ROBERT TAYLOR & CO.,

No. 1900, 1902, 1904 & 1906 Callowhill, St., Philadelphia.

MERCHANT & CO., 507 Market Street, Philadelphia.

General Agents. PARK & CO., 122 Second Avenue, Pittsburgh, Pa.

BUSH HILL IRON WORKS.

Corner 16th & Buttonwood Streets,

PHILADELPHIA.

JAMES MOORE,

(Successor to MATTHEWS & MOORE.)

Engineer, Machinist, Founder and Boilermaker

CASTINGS of every description.

ROLLING MILL AND FURNACE EQUIPMENTS COMPLETE.

Rolls Turned for Rails, Beams, Angles, and all shapes for Iron, Steel, or Composition Metals.

Sugar Mill, Saw Mill and Crist Mill Machinery,

AND MILLWRIGHTING IN GENERAL.

BOILERS—FLUE, TUBULAR AND CYLINDER, and all kinds of TANK AND PLATE IRON WORK.

Pipe, Fittings, &c.

Thomas T. Tasker, Jr.

Stephen P. M. Tasker

**MORRIS, TASKER & CO.,
PASCAL IRON WORKS, Philadelphia,**

TASKER IRON WORKS, New Castle, Del.,



Office, Fifth and Tasker Streets, Philadelphia.

Office and Warehouse, No. 15 Gold Street, New York.
Office and Warehouse, No. 36 Oliver Street, Boston.

MANUFACTURERS OF

WROUGHT IRON WELDED TUBES.

Plain, Galvanized and Rubber-Coated, for Gas, Steam and Water.

Lap-Welded Charcoal Iron Boiler Tubes.

Oil Well Tubing and Casing, Gas and Steam Fittings, Brass and Steam Filters' Tools, Cast Iron Gas and Water Pipe, Street Lamp Posts and Lanterns, Improved Coal-Gas Apparatus, Improved Sugar Machinery, Etc.

BAILEY'S PATENT ADJUSTABLE PLANES.

IRON AND WOOD. 30 different styles.. 90,000 ALREADY IN USE.

Smooth Planes,
Jack Planes,
Fore Planes,
Jointer Planes,
Block Planes,
Rabbet Planes,
Circular Planes.Carpenters,
Cabinet Makers,
Car Builders,
Carriage Makers,
Millwrights,
Wheelwrights,
All Use them.

[No. 9½ Excelsior Block Plane, \$3.00.]

Manufactured by the STANLEY RULE & LEVEL CO.,
Factories: New Britain, Conn. Warehouses: 35 Chambers Street, New York.**Ecton Mills Genuine London
TURKEY EMERY.**ABBOTT & HOWARD, Agents for the United States.
81 John Street, New York. 35 Oliver Street, Boston.**EATON, COLE & BURNHAM CO.,**
58 John Street, New York.

MANUFACTURERS OF

Wrought Iron

PIPE,

Cast Iron

FLANGED PIPE,

Cast Iron

RADIATORS

and BOILERS.

**STEAM GAUGES, TOOLS,**

And all Supplies used by Machinists, &c.

TRADE HOUSE ESTABLISHED, 1862.

GEORGE S. FALES,

SUCCESSOR TO

FAIRBROTHER & FALES

Sole Owner and Manufacturer of

OAK BELTING,

Also, Picker or Moreskin Leather, for Boot and Shoe Packs.

Angular Belting and Pulleys made to order.

PAWTUCKET, R. I.

Ask for Star Stamped Lace Leather.

New Patent "X" Razor Strap.

PATENTED DECEMBER 23, 1873.

This Strap, designated on our List as Letter "X," is of novel construction—is elastic, pleasantly yielding to the razor—gives a keen fine edge—is made of superior stock—is furnished at a low price—and gives universal satisfaction.

ITS PRICE SELLS IT.

BENJAMIN F. BADGER, Sole Manufacturer,

Badger Place, Charlestown, Mass.



Pipe, Fittings, &c.

National Tube Works Co.,

BOSTON, MASS. and MCKEESPORT, PA.,

MANUFACTURERS OF

**Best Quality Lap Welded Iron Boiler Tubes,
STEAM AND GAS PIPE,**

Artesian Oil and Salt Well Tubing and Casing,

With Patent Protecting Coupling;

Mack's Patent Injector for Feeding Boilers.

JAMES C. CONVERSE, President, MCKEESPORT. WM. S. EATON, Treasurer, BOSTON.

New York Office and Warehouse 78 William cor. Liberty Street.

McNab & Harlin Mfg. Co.,

MANUFACTURERS OF

BRASS COCKS**For STEAM, WATER
and GAS.****Wrought Iron Pipe & Fittings, Plain and Galvanized
PLUMBERS' MATERIALS.**

Illustrated Catalogue sent by express to the Trade on application.

Factory, Paterson, N. J.

56 John Street, N. Y.

PANCOAST & MAULE

227 Pear St.

PHILADELPHIA.

WROUGHT IRON PIPE

FITTINGS, BRASS & IRON VALVES & COCKS

TOOLS & STEAM FITTERS SUPPLIES &c.

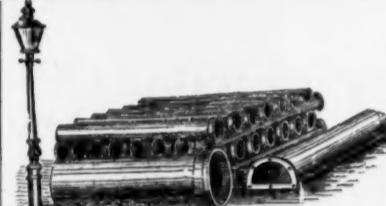
PIPE CUT & FITTED TO PLANS FOR MILLS &c.

CONTRACTORSFOR HIGH & LOW PRESSURE STEAM HEATING
APPARATUS FOR ALL CLASSES OF BUILDINGS.

Send for Illustrated Catalogue.

WM. ESTERBROOK,
Wholesale Manufacturer of
Coal Hods, Fire Shovels, etc.

311 Cherry St., PHILADELPHIA.



R. D. WOOD & CO.,

Philadelphia,

Manufacturers of

Cast Iron Pipe

FOR WATER AND GAS.

Branches Retorts, &c.

Warren Foundry & Machine Co.,

PHILLIPSBURG NEW JERSEY.

Lamp Posts, Valves, &c.,
Mathew's Pat. Anti-Freezing Hydrants,
400 CHESTNUT STREET.

GEORGE BARNES & CO.,



Manufacturers, Syracuse, N. Y.

ENCAUSTIC TILES.

ALEXANDER FINDLAY,

Importer.

99 MAIDEN LANE, N. Y.

Sole Agent in the U. S. for

CRAYEN, DUNNILL & CO., (Limited.)

**TURNED
MACHINE SCREWS.**

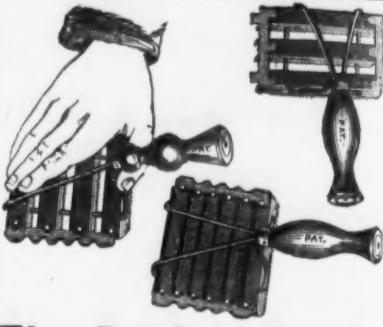
One-sixteenth to five-eighths diameter.

Heads and points to sample.

IRON, STEEL, and BRASS.

Lyon & Fellows Mfg. Co.,

Cor. 1st and North 3d Streets, Williamsburgh, N. Y.

**The Perfect Comb.**

We call your attention specially to our new patent endless wire comb. The result of a long series of experiments, made with a view to the attainment of the requirements of a *Perfect Comb*. It is better, stronger, and more durable than any ever before invented. The raised shank gives what has never before been attained, viz. a ready and firm hold for the hand, so that the hand that cannot come in contact with the horse while using the comb. The wire braces which run from the shank over the back to the front teeth give strength and durability, and at the same time serve as an extra handle; and when clasped by the fingers in connection with the raised shank the comb is more firmly, easily, and completely held, and can be used with much less fatigue than is possible in any other form. The comb is short, and is made but a trial to vindicate its name: *The Perfect Comb*.

THE LAWRENCE COMB CO.
Factory and Office,
382 2d Ave., cor. 22d St., N. Y.

WILLIAMS WHITE & CHURCHILL
Successors to
MACKRELL & RICHARDSON MFG. COMPANY
Manufacturers of

Builders' Hardware,
Locks, Hinges, Hooks and Staples,
Awning Hooks, Meat Hooks, Pincers,
Champion Noiseless Pulleys,
CHAIN PULLEYS &c.
Factory, cor. Flushing and Nostrand Avenues
BROOKLYN.
Warehouse, 73 Warren St., N. Y.

WM. S. CARR & CO.
Sole Manufacturers of
CARR'S
Patent Water Closets,
PUMPS, &c.
Cabinet Wood Work, Vases, &c
106, 108 & 110 Centre Street,
Factory, Mott Haven, New York.

J. AUSTIN & CO.,
168 Fulton Street, N. Y.,
Proprietors and Manufacturers of
WHEATCROFT'S SELF-ADJUSTING

Pipe Wrench,
AND
Scripture's Funnel Top
MACHINE OILERS.
Dealers in
STEAM AND GAS FITTERS TOOLS.

RIEHL BROTHERS,
Ninth Street, near Coates, Philadelphia.
New York Store, 98 Liberty Street.
Pittsburgh Store, 285 Liberty Street.

SCALES
PHILA
ESTABLISHED
SCALE
WORKS
1846

"Patented" Furnace Charging Scale.
Double Beam R. R. Track Scale, Compound Parallel Crane Beams, &c. Patented First Power Lever Wagon Scales. Testing Machines any capacity.

Chapman Valve Mfg. Co.,
STEAM VALVES,
Iron and Composition, of all sizes.

WATER and GAS Gates, 3 to 48 inches
HYDRANTS.

Office and Warehouse, 75 & 77 Kilby St., Boston, Mass.

The Iron Age Directory

and index to Advertisements.

PAGE.	Finting Machines, Makers of.	Sommer Henry, 8 to 12 Pearl, Newark, N. J.	24
	Feider Chas., 18 Chambers, N. Y.	Coff Edward W., 30½ Walnut, Phila.	24
	Feuders and Machinists.	Cort N. L. Co., 220 & 222 Water, N. Y.	24
	Gardner Bros., Co., Pittsburgh, Pa.	Curtiss J. O., 49 John, N. Y.	24
	Galvanized Iron.	Crozier Bros., Troy, N. Y.	24
	Leferts Marshall Jr., 90 Beckman, N. Y.	Gregg H., Co., 108 Walnut, Phila.	24
	Gas Fixtures, Makers of.	Leferts J. C., 241 Pearl, N. Y.	24
	Bradley & Hubbard Mfg. Co., 21 & 24 Barclay, N. Y.	Levitt, Philadelphia.	24
	Glass Importers or.	Levitt, Philadelphia.	24
	Hale B. E. & Co., 56 Park Row, N. Y.	Levitt, Philadelphia.	24
	Agricultural Steels and Irons, etc., Makers of.	Levitt, Philadelphia.	24
	Nelis A. J. & Co., Pittsburgh, Pa.	Levitt, Philadelphia.	24
	Air Pistols, Makers of.	Levitt, Philadelphia.	24
	Pope Bros., 15 High, Boston.	Levitt, Philadelphia.	24
	Alarm Traps.	Levitt, Philadelphia.	24
	Tulip Dorse, Indianapolis, Ind.	Levitt, Philadelphia.	24
	Anvils, Manufacturers of.	Levitt, Philadelphia.	24
	Fisher & North, Trenton, N. J.	Levitt, Philadelphia.	24
	Anzers, Bits, etc., Manufacturers of.	Levitt, Philadelphia.	24
	John A. D. & Co., New York, N. Y.	Levitt, Philadelphia.	24
	Axes, Edge Tools, &c., Manufacturers of.	Levitt, Philadelphia.	24
	Francis A. Co., Buffalo, N. Y.	Levitt, Philadelphia.	24
	Axes, Springs, etc., Manufacturers.	Levitt, Philadelphia.	24
	Brown D. Arthur & Co., Flushing, Concord, N. H.	Levitt, Philadelphia.	24
	Clark Smith & Co., Fort Plain, N. Y.	Levitt, Philadelphia.	24
	Brown & G. Co., Field, Brooklyn, E. D.	Levitt, Philadelphia.	24
	Wendworth H. & Co., Gardner.	Levitt, Philadelphia.	24
	Band Saws and Tools for Brazing &c., Importers of.	Levitt, Philadelphia.	24
	Green George & Son, 39 Wood, N. Y.	Levitt, Philadelphia.	24
	Bell Metal, Makers of.	Levitt, Philadelphia.	24
	Shelton & Co., Birmingham, Conn.	Levitt, Philadelphia.	24
	Beltwows, Manufacturers of.	Levitt, Philadelphia.	24
	Chase & Joseph, Buffalo, N. Y.	Levitt, Philadelphia.	24
	Woodcock Brothers, Water, N. Y.	Levitt, Philadelphia.	24
	Scott Geo. M., Chicago, Ill.	Levitt, Philadelphia.	24
	Bells.	Levitt, Philadelphia.	24
	Brainerd & Brokken, Lebanon, Pa.	Levitt, Philadelphia.	24
	Bits, Holes, Makers of.	Levitt, Philadelphia.	24
	Aray, C. W., 301 Cherry, Philadelphia.	Levitt, Philadelphia.	24
	Alexander Bros., 419 N. 3rd, Phila.	Levitt, Philadelphia.	24
	Fales Geo. S., Pawtucket, R. I.	Levitt, Philadelphia.	24
	Birds, Manufacturers of.	Levitt, Philadelphia.	24
	Heins, Pierce & Munschauer, Buffalo, N. Y.	Levitt, Philadelphia.	24
	Lindeman O. & Co., 254 Pearl, N. Y.	Levitt, Philadelphia.	24
	Maxheimer John, 20 Pearl, N. Y.	Levitt, Philadelphia.	24
	Turner R. A., 51 Chambers, N. Y.	Levitt, Philadelphia.	24
	Van Wart & McCoy, 141 and 150 Duane, N. Y.	Levitt, Philadelphia.	24
	Wilson J. Clark & Co., Beckman, N. Y.	Levitt, Philadelphia.	24
	Hardware Importers.	Levitt, Philadelphia.	24
	American Spiral Spring Bldg. Co., 92 Beckman, N. Y.	Levitt, Philadelphia.	24
	Enterprise Mfg. Co., Phila.	Levitt, Philadelphia.	24
	Pratt & Co., 254 Pearl, N. Y.	Levitt, Philadelphia.	24
	Providence Tool Co., Providence, R. I.	Levitt, Philadelphia.	24
	Turner R. A., 51 Chambers, N. Y.	Levitt, Philadelphia.	24
	Van Wagoner & Williams, 82 Beckman, N. Y.	Levitt, Philadelphia.	24
	Williams, White & Churchill, 73 Warren, N. Y.	Levitt, Philadelphia.	24
	Waterbury Brass Co., 52 Beckman, N. Y.	Levitt, Philadelphia.	24
	Hardware Importers.	Levitt, Philadelphia.	24
	Bracher T. W., 71 Greene, N. Y.	Levitt, Philadelphia.	24
	Buntington & Northup, Rochester.	Levitt, Philadelphia.	24
	Eagle Mfg. Co., Newark, N. J.	Levitt, Philadelphia.	24
	Enterprise Co., Pine Meadow, Conn.	Levitt, Philadelphia.	24
	Plumb. & Barnard, Buffalo, N. Y.	Levitt, Philadelphia.	24
	Hardware Importers.	Levitt, Philadelphia.	24
	American Steel, Lowell, Mass.	Levitt, Philadelphia.	24
	Forsyth S. & Co., Manchester, N. H.	Levitt, Philadelphia.	24
	William Gardner's Sons, 575 Grand, N. Y.	Levitt, Philadelphia.	24
	Brass Manufacturers of.	Levitt, Philadelphia.	24
	Adams & Co., 19 Chest, N. Y.	Levitt, Philadelphia.	24
	Bolt Head & Hackin, Manufacturers of.	Levitt, Philadelphia.	24
	Chart Machine Co., Pine Meadow, Conn.	Levitt, Philadelphia.	24
	Plumb. & Barnard, Buffalo, N. Y.	Levitt, Philadelphia.	24
	Hardware Importers.	Levitt, Philadelphia.	24
	Ames, Wood, Phillipsburg, N. J.	Levitt, Philadelphia.	24
	Bolt Head & Hackin, Manufacturers of.	Levitt, Philadelphia.	24
	Chart Machine Co., Pine Meadow, Conn.	Levitt, Philadelphia.	24
	Plumb. & Barnard, Buffalo, N. Y.	Levitt, Philadelphia.	24
	Hardware Importers.	Levitt, Philadelphia.	24
	Brainerd & Brokken, Lebanon, Pa.	Levitt, Philadelphia.	24
	Bridges, Builders.	Levitt, Philadelphia.	24
	Brick & Tile Works, and Roof Co., 3 Dey, N. Y.	Levitt, Philadelphia.	24
	Bronze Hardware, Manufacturers of.	Levitt, Philadelphia.	24
	Hopkin & Dickinson Mfg. Co., 69 Duane, N. Y.	Levitt, Philadelphia.	24
	Butcher Knives, Manufacturers of.	Levitt, Philadelphia.	24
	Wicks, Sheath, English.	Levitt, Philadelphia.	24
	Butts and Hinges, Manufacturers of.	Levitt, Philadelphia.	24
	American Butt Co., Providence, R. I.	Levitt, Philadelphia.	24
	Brown & Co., 160 Franklin, N. Y.	Levitt, Philadelphia.	24
	Crooke & Sons, 180 John, N. Y.	Levitt, Philadelphia.	24
	Davol, John & Sons, 100 John, N. Y.	Levitt, Philadelphia.	24
	Holmes, Booth & Haynes, 49 Chambers, N. Y.	Levitt, Philadelphia.	24
	Manly & Son, 51 Chambers, N. Y.	Levitt, Philadelphia.	24
	Plume & Atwood Mfg. Co., 66 Chambers, N. Y.	Levitt, Philadelphia.	24
	Scovill Mfg. Co., 421 Browne, N. Y.	Levitt, Philadelphia.	24
	Waterbury Brass Co., 52 Beckman, N. Y.	Levitt, Philadelphia.	24
	Hardware Importers.	Levitt, Philadelphia.	24
	Brainerd & Brokken, Lebanon, Pa.	Levitt, Philadelphia.	24
	Bridges, Builders.	Levitt, Philadelphia.	24
	Brick & Tile Works, and Roof Co., 3 Dey, N. Y.	Levitt, Philadelphia.	24
	Bronze Hardware, Manufacturers of.	Levitt, Philadelphia.	24
	Hopkin & Dickinson Mfg. Co., 69 Duane, N. Y.	Levitt, Philadelphia.	24
	Butcher Knives, Manufacturers of.	Levitt, Philadelphia.	24
	Wicks, Sheath, English.	Levitt, Philadelphia.	24
	Butts and Hinges, Manufacturers of.	Levitt, Philadelphia.	24
	American Butt Co., Providence, R. I.	Levitt, Philadelphia.	24
	Brown & Co., 160 Franklin, N. Y.	Levitt, Philadelphia.	24
	Crooke & Sons, 180 John, N. Y.	Levitt, Philadelphia.	24
	Davol, John & Sons, 100 John, N. Y.	Levitt, Philadelphia.	24
	Holmes, Booth & Haynes, 49 Chambers, N. Y.	Levitt, Philadelphia.	24
	Manly & Son, 51 Chambers, N. Y.	Levitt, Philadelphia.	24
	Plume & Atwood Mfg. Co., 66 Chambers, N. Y.	Levitt, Philadelphia.	24
	Scovill Mfg. Co., 421 Browne, N. Y.	Levitt, Philadelphia.	24
	Waterbury Brass Co., 52 Beckman, N. Y.	Levitt, Philadelphia.	24
	Hardware Importers.	Levitt, Philadelphia.	24
	Brainerd & Brokken, Lebanon, Pa.	Levitt, Philadelphia.	24
	Bridges, Builders.	Levitt, Philadelphia.	24
	Brick & Tile Works, and Roof Co., 3 Dey, N. Y.	Levitt, Philadelphia.	24
	Bronze Hardware, Manufacturers of.	Levitt, Philadelphia.	24
	Hopkin & Dickinson Mfg. Co., 69 Duane, N. Y.	Levitt, Philadelphia.	24
	Butcher Knives, Manufacturers of.	Levitt, Philadelphia.	24
	Wicks, Sheath, English.	Levitt, Philadelphia.	24
	Butts and Hinges, Manufacturers of.	Levitt, Philadelphia.	24
	American Butt Co., Providence, R. I.	Levitt, Philadelphia.	24
	Brown & Co., 160 Franklin, N. Y.	Levitt, Philadelphia.	24
	Crooke & Sons, 180 John, N. Y.	Levitt, Philadelphia.	24
	Davol, John & Sons, 100 John, N. Y.	Levitt, Philadelphia.	24
	Holmes, Booth & Haynes, 49 Chambers, N. Y.	Levitt, Philadelphia.	24
	Manly & Son, 51 Chambers, N. Y.	Levitt, Philadelphia.	24
	Plume & Atwood Mfg. Co., 66 Chambers, N. Y.	Levitt, Philadelphia.	24
	Scovill Mfg. Co., 421 Browne, N. Y.	Levitt, Philadelphia.	24
	Waterbury Brass Co., 52 Beckman, N. Y.	Levitt, Philadelphia.	24
	Hardware Importers.	Levitt, Philadelphia.	24
	Brainerd & Brokken, Lebanon, Pa.	Levitt, Philadelphia.	24
	Bridges, Builders.	Levitt, Philadelphia.	24
	Brick & Tile Works, and Roof Co., 3 Dey, N. Y.	Levitt, Philadelphia.	24
	Bronze Hardware, Manufacturers of.	Levitt, Philadelphia.	24
	Hopkin & Dickinson Mfg. Co., 69 Duane, N. Y.	Levitt, Philadelphia.	24
	Butcher Knives, Manufacturers of.	Levitt, Philadelphia.	24
	Wicks, Sheath, English.	Levitt, Philadelphia.	24
	Butts and Hinges, Manufacturers of.	Levitt, Philadelphia.	24
	American Butt Co., Providence, R. I.	Levitt, Philadelphia.	24
	Brown & Co., 160 Franklin, N. Y.	Levitt, Philadelphia.	24
	Crooke & Sons, 180 John, N. Y.	Levitt, Philadelphia.	24
	Davol, John & Sons, 100 John, N. Y.	Levitt, Philadelphia.	24
	Holmes, Booth & Haynes, 49 Chambers, N. Y.	Levitt, Philadelphia.	24
	Manly & Son, 51 Chambers, N. Y.	Levitt, Philadelphia.	24
	Plume & Atwood Mfg. Co., 66 Chambers, N. Y.	Levitt, Philadelphia.	24
	Scovill Mfg. Co., 421 Browne, N. Y.	Levitt, Philadelphia.	24
	Waterbury Brass Co., 52 Beckman, N. Y.	Levitt, Philadelphia.	24
	Hardware Importers.	Levitt, Philadelphia.	24
	Brainerd & Brokken, Lebanon, Pa.	Levitt, Philadelphia.	24
	Bridges, Builders.	Levitt, Philadelphia.	24
	Brick & Tile Works, and Roof Co., 3 Dey, N. Y.	Levitt, Philadelphia.	24
	Bronze Hardware, Manufacturers of.	Levitt, Philadelphia.	24
	Hopkin & Dickinson Mfg. Co., 69 Duane, N. Y.	Levitt, Philadelphia.	24
	Butcher Knives, Manufacturers of.	Levitt, Philadelphia.	24
	Wicks, Sheath, English.	Levitt, Philadelphia.	24
	Butts and Hinges, Manufacturers of.	Levitt, Philadelphia.	24
	American Butt Co., Providence, R. I.	Levitt, Philadelphia.	24
	Brown & Co., 160 Franklin, N. Y.	Levitt, Philadelphia.	24
	Crooke & Sons, 180 John, N. Y.	Levitt, Philadelphia.	24
	Davol, John & Sons, 100 John, N. Y.	Levitt, Philadelphia.	24
	Holmes, Booth & Haynes, 49 Chambers, N. Y.	Levitt, Philadelphia.	24
	Manly & Son, 51 Chambers, N. Y.	Levitt, Philadelphia.	24
	Plume & Atwood Mfg. Co., 66 Chambers, N. Y.	Levitt, Philadelphia.	24
	Scovill Mfg. Co., 421 Browne, N. Y.	Levitt, Philadelphia.	24
	Waterbury Brass Co., 52 Beckman, N. Y.	Levitt, Philadelphia.	24
	Hardware Importers.	Levitt, Philadelphia.	24
	Brainerd & Brokken, Lebanon, Pa.	Levitt, Philadelphia.	24
	Bridges, Builders.	Levitt, Philadelphia.	24
	Brick & Tile Works, and Roof Co., 3 Dey, N. Y.	Levitt, Philadelphia.	24
	Bronze Hardware, Manufacturers of.	Levitt, Philadelphia.	24
	Hopkin		

Portable Water Wheels—Mine-Drilling.

Since the days when the great English engineer (Stephenson) made steam-power not only portable but locomotive, portable powers have generally been associated in men's minds with steam. On the other hand, water-powers and water-wheels have been considered as permanent and local as the stream, or indeed, the mill site itself. Water-power has been the "mountain" which would not come to the manufacturing "Mahomet," and therefore, for many years, the said Mahomet has come to the mountain.

Now, however, the application of small streams and high falls to small turbines in the East, and the great ditches and sluices, flumes and tunnels of the West, conveying water miles from its source, has so changed all this that water-power also has become practically portable and even peripatetic, though not as yet locomotive.

Let us look a little at the steps leading to this really wonderful result.

The turbine water-wheel was early found to be well adapted to a low fall where neither over shot nor breast wheels could be used. In such localities an abundance of water on a large wheel supplied the want of a higher fall, and, while it gave a slow and steady motion, gave great power. The problem of getting a high rate of speed from large power, although slow motion, by gearing up or taking off from large to small pulleys, was solved long ago and found to be practicable. But the truth, of course, of that proposition, that is the belting down (if one may so term it) of a high rate of speed so as to get from it great power, was not so well ascertained. It was known that a light stream and high fall on a small Turbine of from 10 to 15 inches in diameter, would produce a lightning like speed. But could this speed be checked and converted into power? was the question. It was an interesting problem not only to scientists but to practical millwrights. At Utica, N. Y., is a small stream falling over the steep face of a high hill, furnishing a small but even amount of water, and having a vertical fall of more than 95 feet. At the foot of the hill stands a large flour mill with four run of 4½ feet burrs and all its elevators, separators, smutters, packers and other machinery. A Leffel Turbine wheel of 5½ inches in diameter, made of steel and brass, and finished and polished to the last degree, so reduced as to use only the water of an 11½ inch wheel, was put in and the water brought in iron pipes from the mountain top to the wheel with the pressure of 95 feet fall. On the upright shaft of the wheel was secured a pulley of 26 inch face, on which worked a belt of equal width, connecting the wheel with the whole machinery of the mill, whereby the owner undertook to control and check the great speed of the wheel, and tame and calm it down to doing the work of that large mill; and he did it. The success was perfect, and the owner of the mill is confident that that little wheel will run two more pair of burrs.

Thus the way was paved for making a water-wheel portable, as all must see that to be portable at all a wheel must be small and light.

The conditions being so, it only remained to await the time, place and occasion, to still further extend the utility of water-wheels, and California has furnished all of these. It was found in the mines there that hand drilling of blasting holes, three men to the pair (one to turn and two to strike) was an expensive process, and for some time past machines for drilling these holes, driven by power, have been substituted for hand work, the Diamond, the Burleigh and the Blatchley being the drills chiefly used up to date. At first they undertook to run these drills by steam-power, but the heat from the steam pipes, added to the already great heat of many mines, rendered the tunnels and drifts untenable for the miners. Next, compressed air was tried, but the great cost of the plant for this power rendered it unsuitable to mining work in many places. But the great ditches and sluices for furnishing water for washing gold and for hydraulic mining were far up on the mountain side, and the necessary high fall secured, while the small size and light weight of the turbine wheel rendered it possible to place one on a drill car; so, on the track, extending into the mining tunnel, a car is placed, the drill machinery on its front end and the turbine water-wheel on its rear end. Thus equipped the car is moved along the track to the breast of the drift or tunnel; the water, brought from the ditch on the mountain side above, in iron pipes to the mouth of the tunnel, is concentrated through hose along the tunnel and applied to the water-wheel on the rear end of the drill car, thus, economically and pleasantly to all concerned, driving the drills. When the holes are bored the hose is detached, the drill-car moved back and switched on to a side track in an enlargement of the tunnel until the blasts are made, the rock car brought in and the debris removed, when it is ready to repeat the operation. In some places, where water is scarce and "miners' inches" high in price, a waste-pipe or hose takes the water from below the wheel to a tank at the tunnel's mouth; a steam pump forces it to a reservoir above, whence it is again let into the supply pipe and so used over again indefinitely.

This rendering of the waterwheel itself portable, and enabling it to do its work at the very place where the work is needed, seems a greater triumph of ingenuity and invention than the bringing of water, which supplies its motive power, so far from its native source.—*Mining and Science.*

The large and highly productive iron ore bed of the Ironton Railroad Company, at Ironton, Lehigh county, Pa., covering a space of several acres, has for the past four weeks been standing under water to a depth of at least 15 feet, in consequence of which operations have, out of necessity, been at a standstill.



Stafford Manufacturing Co.'s STENCIL COMBINATIONS.

Containing: Stencil Alphabet, Figures, Can Stencil Ink and Brush.
For marking boxes, barrels, bags, and packages for shipment. Printing all manner of show cards, notices, signs, numbers, prices, &c., and other purposes too numerous to mention. Instructive and amusing for boys.

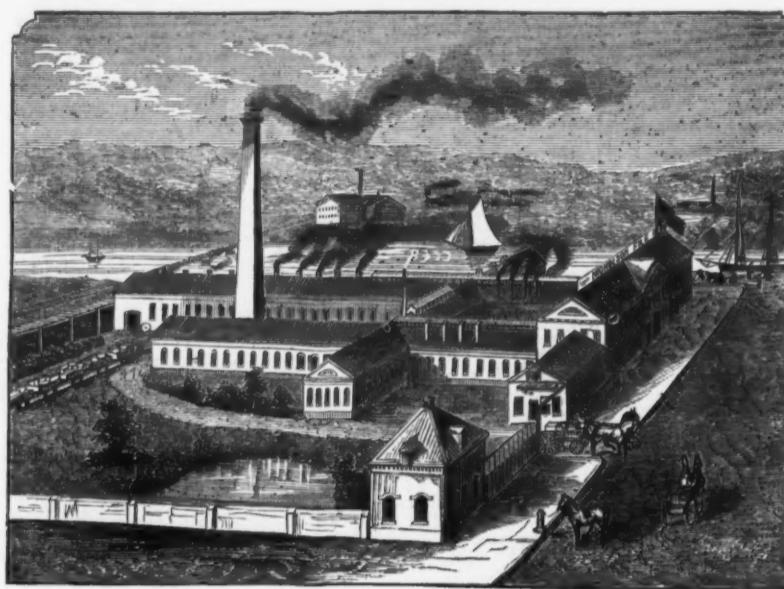
WHOLESALE PRICES.

Size, $\frac{1}{2}$ in. per dozen	\$6.00	Size, $\frac{3}{4}$ in. per dozen	\$10.00
" $\frac{3}{4}$ "	6.50	" $\frac{5}{8}$ "	12.00
" 1 "	10.00	" $\frac{3}{4}$ "	18.00
" $\frac{5}{8}$ "	9.00	" $\frac{7}{8}$ " with lower case	15.00

An illustration of sizes sent on application.

For sale by Hardware Dealers and Stationers.

No. 66 Fulton Street, New York.



DEALERS AND CONSUMERS

OF FILES

SHOULD PURCHASE THE

Nicholson or "Increment Cut" File

FOR THE FOLLOWING REASONS:

First.—They are made from the best quality of File Steel.

Second.—Each File undergoes a careful inspection after each operation, by critical inspectors, and none but perfect work allowed to pass.

Third.—They are cut by the "Increment" or irregular cut, therefore combine the advantages of both Hand and Machine work.

Fourth.—They will finish finer than Files of any other make of same degree of coarseness.

Fifth.—They will not "pin" or scratch like hand-cut Files.

Sixth.—The "Increment cut" File, by our records, will remove more stock with a given number of pounds applied than any other File with which we are acquainted.

Seventh.—All Files under seven inches are put up in boxes of one dozen each, and neatly labeled.

Eighth.—The large stock carried by us, combined with our superior facilities, enables us to fill the largest orders at the shortest possible notice.

Ninth.—We are constantly making careful tests of our Files by delicately constructed machinery, which automatically records the actual power applied, forward, backward and downward, at each stroke of the File, also the number of strokes, combined with the work performed, enables us not only to judge of the quality of our Steel for wear, but also of the cutting qualities of the File, and the ease (expressed in pounds) with which a given amount of work can be accomplished.

Finally.—Our Files are warranted to be hard, well cut and sound. They are exclusively used by many of the largest Railroads and Machinists in the country—and the vigorous growth of our reputation, not only for making a good article, but of our ability to furnish a good article cheap, is evidenced by the large number of Dealers and Jobbers who are handling our Files exclusively.

NICHOLSON FILE COMPANY, Providence, R. I.

SOLD BY HARDWARE DEALERS GENERALLY.

NEW HAVEN NUT CO.,

MANUFACTURERS OF

HOT PRESSED NUTS

of Superior Quality of all sizes, both

HEXAGON & SQUARE,

From $\frac{1}{8}$ inch to and including $1\frac{1}{2}$ inch Bolt.

Factory and Office, - - - - - WESTVILLE, CONN.

SUPPLIES

Railways, Machinists and Amateurs,
Gum and Leather Belting, Packings and Cotton
Waste, Babbitt Metal.

FINE TOOLS

for Machinists and Amateurs; Barnes' Foot Power
Scroll Saw; Foot Lathes all kinds. Sole Agents
Baxter Steam Engine, Iron and Wood Working
Machinery. Send for Price Lists.

JACKSON & TYLER,

16 German St., Baltimore, Md.

PENNA. WAREHOUSING

AND

SAFE DEPOSIT CO.

WAREHOUSES:

FRONT AND LOMBARD STREETS.

IRON STORAGE YARDS:

Port Richmond, Philada; Reading, Pa.;

Allentown, Pa.

NEGOTIABLE RECEIPTS ISSUED.

OFFICE OF THE CO.:

N. W. cor. Third & Chestnut Sts

OFFICERS:

THOS. L. JEWETT, President. B. K. JAMISON, Vice-President.

JAMES P. SCOTT, Secretary and Treasurer. J. M. COLLINWOOD, Genl Sup't.

DIRECTORS:

Henry Pemberton, Geo. W. Woodward,

Henry P. Sloan, L. C.atherwood,

P. C. Hollis, D. A. Dainger,

J. T. Audenried.

WILSON & EVENDEN'S PATENT OIL TANKS.



Superior to all others for Carbon and Lubricating Oils

For descriptive circulars and prices address the manufacturers,

Shipping Can Mfg. Co.,

E. F. W. WETZEL,

75 Warren St., New York.

GEO. W. BRUCE

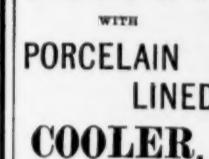
No. 1 Platt Street, N. Y.
Has secured the entire product of the INTERNATIONAL SCREW WORKS, in addition to his imports of the Birmingham and Imperial Cast Iron.

IRON AND BRASS SCREWS, which form an unrivaled assortment of these goods, in spite of the misrepresentations of competitors.



Pronounced the most Convenient and Perfect Family Refrigerator made.

Jewett's Patent WATER Filter



Send for Circulars to only Manufacturers

JOHN C. JEWETT & SONS, Buffalo, N. Y.

JAMES HENSHALL, Engineer, Machinist & Blacksmith,

1050 Beach St. PHILADELPHIA.

Drawings made to order. Repairing of all kinds promptly attended to. Blacksmithing executed at all its branches.

HOWSONS'

OFFICES FOR PROSECUTING

UNITED STATES AND FOREIGN PATENTS,

Forrest Building,

119 SOUTH FOURTH ST. PHILADELPHIA,

AND MARBLE BUILDINGS,

605 Seventh St. (Opposite U. S. Patent Offce., Washington, D. C.)

H. HOWSON, Solicitor of Patents. | O. HOWSON, Attorney.

Communications should be addressed to the PRINCIPAL OFFICES PHILADELPHIA.

COX & COX,

Counsellors at Law,

229 Broadway, NEW YORK.

Practice in cases relating to

PATENTS and TRADE MARKS.

Before the Courts and Patent Office.

Burke & Fraser,

SOLICITORS OF

PATENTS

37 PARK ROW, N. Y. CITY.

Established 1851.

Thomas D. Stetson, Esq., Murray St., N. Y.

Solicitor of Patents, and Scientific Expert in patent cases.

PATENTS.

Send for circular.

HENRY DISSTON & SONS, Keystone Saw, Tool, Steel and File Works,

Front and Laurel Streets, Philadelphia.

Branch Works, Tacony, Philadelphia.

Branch House, Randolph & Market Streets, Chicago, Ill.

MANUFACTURERS OF

SHEET STEEL, and all Articles made from Sheet Steel.

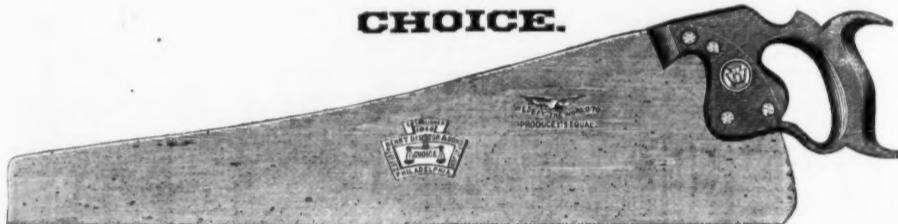
SAWS OF EVERY DESCRIPTION.

Also, FILES, TOOLS, Etc., and all kinds of Labor Saving Implements for keeping Saws in perfect order.

HENRY DISSTON & SONS'

New Patent Skew-back Hand-Saw,

CHOICE.

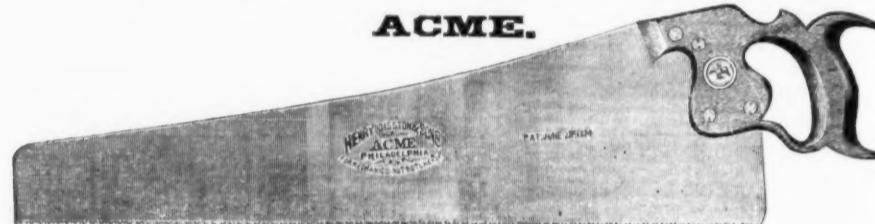


This Saw is the "CHOICE" of all first-class Mechanics who have used it.

HENRY DISSTON & SONS'

New Patent Skew-back Hand-Saw,

ACME.

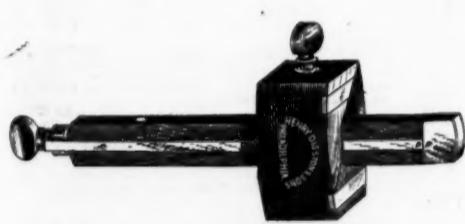


We consider these Saws to be the ACME of perfection. So say all first-class Mechanics who have used them.

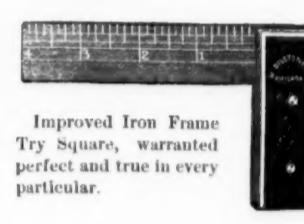
HENRY DISSTON & SONS'

Patent Skew-back Hand-Saw

NEW No. 7.



Even in price and quality with our celebrated No. 7 Saw. Warranted to give satisfaction every time.



Improved Iron Frame Try Square, warranted perfect and true in every particular.

It is singular, yet true, that although immense improvements have been made of late years, in the grinding, temper, and finish of Hand Saws, still in shape and style they much resemble the Hand Saws of centuries ago. We have recently patented a Hand Saw which, we believe, combines numerous advantages over the old-style Saw, being lighter and more easy to handle, stronger in proportion to the amount of metal in the blade, and more free from tremor when in use than the ordinary Hand Saw. To these Saws are attached our new patent handles, which possess many advantages over the old style. They bring the operator closer to his work, and in some of them the blade of the saw is imbedded in the handle, imparting strength in case of an accidental blow or a fall. The Rip Saw handle is coped out to admit the thumb of the left hand, and thus give the operator unlimited power and command over the Saw when it is desirable to use both hands.



A cheap Saw, fully guaranteed. Six tools in one. Adapted to farmers' or plantation use. A Rip and Cross-Cut Saw, Square, Rule, Straight Edge and Scratch Awl combined.



Hand Saw with adjustable handle. The thumb screws in the handle operate on the butt of the saw blade, and can be so adjusted as to give the blade any desired pitch.

New York Wholesale Prices, May 19, 1875.

HARDWARE.

Tee Calks.	\$ 18c net
Pebbles.	\$ 18c net
Enterprise Mfg. Co. (Champion).	dis 20 \$
Wood Bottom.	per doz \$12 - dis 25 & 30 \$
All Iron.	per doz \$17 - dis 25 & 30 \$
TINNERS' Tools and Machines.	\$14 net
Traps.	
Newhouse.	dis 20 \$
Peck, Stow & Wilcox.	dis 20 \$
new list dis 25 \$	
Mosse's Wood Choker.	w doz holes, 15 @ 16c
" Patent Choker Union.	dis 20 \$
Trap.	dis 20 \$
Round, Wire.	dis 20 \$
Square,	dis 20 \$
Cage,	dis 20 \$
Travelling.	
Lothrop's Brick and Plastering.	dis 10 \$
Dixon's Plastering.	dis 12 1/2 \$
Dixon's Brick.	dis 12 1/2 \$
Rose's Brick.	dis 12 1/2 \$
Brown's Brick.	gold, dis 10 \$
Wornall's Brick and Plastering.	dis 10 \$
Garden.	dis 25 \$
Trifles.	
Bacon and Cheese.	dis 25 \$
Ventilators (Window).	nickel and gilt, per dozen \$16.00 @ 15.00
Vises.	
Travel Vises, Solid Box.	16c
40 to 160 lbs.	18c
160 and over.	18c
Peterson's Solid Box.	dis 10 \$
Si to 100 lbs.	18c
160 and upward.	22c
Wilson's Parallel.	dis 10 \$
Herrick & Union Parallel.	dis 25 \$
Buffalo, Parallel.	new list dis 25 \$
Flaser's Parallel.	dis 10 \$
Merrill's Parallel.	dis 15 \$
Parker's.	dis 20 \$
Stephens Parallel.	dis 20 \$
Stephens Saw Fliers.	dis 20 \$
Steans's Saw Fliers.	dis 20 \$
Wheel Barrows.	
Canal Tug Boats (Chapman).	new list dis 10 \$
Canal Gondolas and Boats (Pugley & Chapman).	dis 25 \$
Well Wheels.	Revised list.
Wire.	dis 60 & 10 \$
Plated Copper.	dis 10 \$
Bright and Annealed.	dis 10 \$
" " 19 to 20 doz 47 1/2 % 52 1/2 %	
Connered.	21 to 22 doz 52 1/2 % 57 1/2 %
Galvanized, Nos. 9 to 9.	dis 18c
Galvanized, Nos. 10 to 18.	market list dis 10 to 15 \$
Flamed.	dis 15 \$
Painted.	dis 15 \$
Tinned.	dis 15 \$
Tinned Bright Wire.	dis 10 to 20 \$
Galvanized Telegraph, Nos. 8 and 9.	dis 10 to 20 \$
Galvanized Telegraph, Nos. 10 and 11.	dis 10 to 20 \$
" Grape," " 10 to 14.	dis 10 to 20 \$
Fence Staples.	dis 8 @ 25c
Stainless Wire.	dis 10 to 20 \$
Judd's Picture Wire.	dis 10 \$
Wrenches.	
American Adjustable.	dis 45 \$
Baxter's Adjustable.	dis 20 \$
Diagonal.	dis 20 \$
Collins & Co.'s.	dis 45 \$
Coe's Genuine.	dis 45 \$
" Malleable."	dis 60 & 10 \$
Lindsay's Patent.	dis 25 \$
Taff's Pattern.	dis 70 & 10 \$
Davis' Patent.	new list dis 10 \$
Bennis & Co.'s Patent Combination.	dis 20 & 5 \$
" Merrick's Pattern.	dis 25 & 10 \$
Austin's Patent.	dis 15 & 5 \$
Wingers.	dis 10 \$
Providence.	less than 3 doz 30 cents 3 doz lots
Reliance.	dis 60 @ 45 \$
Universal Extra.	dis 60 @ 45 \$
No. 1.	dis 60 @ 45 \$
Sherman's.	dis 60 @ 45 \$
Eureka (Friction).	dis 60 @ 60 \$

TIN WARE AND TRIMMINGS.

STAMPED TIN WARE, dis 5%.

COMMON STAMPED WARE, &c.

Bucket Covers.

Quarts.

5 1/2 5 1/2 6 1/2 6 1/2 7 1/2 8

Inch.

\$2.00 2.00 3.00 4.00 5.00 5.75

Per gross.

8 8 8 8 10 10

Quarts.

8 8 8 8 10 10

Inch.

\$2.00 2.00 3.00 4.00 5.00 5.75

Per gross.

12 1/2 12 1/2 12 1/2 12 1/2 12 1/2 12 1/2

Inch.

12 1/2 12 1/2 12 1/2 12 1/2 12 1/2 12 1/2

Per gross.

12 1/2 12 1/2 12 1/2 12 1/2 12 1/2 12 1/2

Inch.

12 1/2 12 1/2 12 1/2 12 1/2 12 1/2 12 1/2

Per gross.

12 1/2 12 1/2 12 1/2 12 1/2 12 1/2 12 1/2

Inch.

12 1/2 12 1/2 12 1/2 12 1/2 12 1/2 12 1/2

Per gross.

12 1/2 12 1/2 12 1/2 12 1/2 12 1/2 12 1/2

Inch.

12 1/2 12 1/2 12 1/2 12 1/2 12 1/2 12 1/2

Per gross.

12 1/2 12 1/2 12 1/2 12 1/2 12 1/2 12 1/2

Inch.

12 1/2 12 1/2 12 1/2 12 1/2 12 1/2 12 1/2

Per gross.

12 1/2 12 1/2 12 1/2 12 1/2 12 1/2 12 1/2

Inch.

12 1/2 12 1/2 12 1/2 12 1/2 12 1/2 12 1/2

Per gross.

12 1/2 12 1/2 12 1/2 12 1/2 12 1/2 12 1/2

Inch.

12 1/2 12 1/2 12 1/2 12 1/2 12 1/2 12 1/2

Per gross.

12 1/2 12 1/2 12 1/2 12 1/2 12 1/2 12 1/2

Inch.

12 1/2 12 1/2 12 1/2 12 1/2 12 1/2 12 1/2

Per gross.

12 1/2 12 1/2 12 1/2 12 1/2 12 1/2 12 1/2

Inch.

12 1/2 12 1/2 12 1/2 12 1/2 12 1/2 12 1/2

Per gross.

12 1/2 12 1/2 12 1/2 12 1/2 12 1/2 12 1/2

Inch.

12 1/2 12 1/2 12 1/2 12 1/2 12 1/2 12 1/2

Per gross.

12 1/2 12 1/2 12 1/2 12 1/2 12 1/2 12 1/2

Inch.

12 1/2 12 1/2 12 1/2 12 1/2 12 1/2 12 1/2

Per gross.

12 1/2 12 1/2 12 1/2 12 1/2 12 1/2 12 1/2

Inch.

12 1/2 12 1/2 12 1/2 12 1/2 12 1/2 12 1/2

Per gross.

12 1/2 12 1/2 12 1/2 12 1/2 12 1/2 12 1/2

Inch.

12 1/2 12 1/2 12 1/2 12 1/2 12 1/2 12 1/2

Per gross.

12 1/2 12 1/2 12 1/2 12 1/2 12 1/2 12 1/2

Inch.

12 1/2 12 1/2 12 1/2 12 1/2 12 1/2 12 1/2

Per gross.

12 1/2 12 1/2 12 1/2 12 1/2 12 1/2 12 1/2

Inch.

12 1/2 12 1/2 12 1/2 12 1/2 12 1/2 12 1/2

Per gross.

12 1/2 12 1/2 12 1/2 12 1/2 12 1/2 12 1/2

Inch.

12 1/2 12 1/2 12 1/2 12 1/2 12 1/2 12 1/2

Per gross.

12 1/2 12 1/2 12 1/2 12 1/2 12 1/2 12 1/2

Inch.

12 1/2 12 1/2 12 1/2 12 1/2 12 1/2 12 1/2

Per gross.

12 1/2 12 1/2 12 1/2 12 1/2 12 1/2 12 1/2

Inch.

12 1/2 12 1/2 12 1/2 12 1/2 12 1/2 12 1/2

Per gross.

12 1/2 12 1/2 12 1/2 12 1/2 12 1/2 12 1/2

Inch.

12 1/2 12 1/2 12 1/2 12 1/2 12 1/2 12 1/2

Per gross.

12 1/2 12 1/2 12 1/2 12 1/2 12 1/2 12 1/2

Inch.

12 1/2 12 1/2 12 1/2 12 1/2 12 1/2 12 1/2

Per gross.

12 1/2 12 1/2 12 1/2 12 1/2 12 1/2 12 1/2

Inch.

12 1/2 12 1/2 12 1/2 12 1/2 12 1/2 12 1/2

Per gross.

12 1/2 12 1/2 12 1/2 12 1/2 12 1/2 12 1/2

Inch.

12 1/2 12 1/2 12 1/2 12 1/2 12 1/2 12 1/2

Per gross.

12 1/2 12 1/2 12 1/2 12 1/2 12 1/2 12 1/2

Inch.

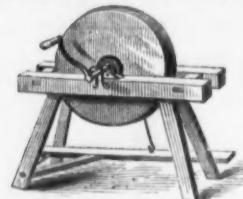
12 1/2 12 1/2 12 1/2 12 1/2 12 1/2 12 1/2

Per gross.

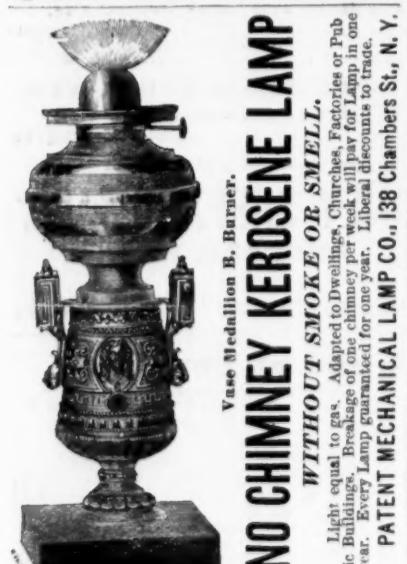
12 1/2 12 1/2 12 1/2 12 1/2 12 1/2 12 1/2

Inch.

Grindstones, Emery, &c.

Walter R. Wood,
GRINDSTONES.SOLE AGENT OF THE
BEREA STONE CO., of Ohio.
NOVA SCOTIA and other brands.
283 & 285 Front Street, New York.Grindstones.
AMHERST,
INDEPENDENCE,
LAKE HURON,
AND BEREA.Also Scythe Stones.
WORTHINGTON & SONS, Mfrs.,
North Amherst, Ohio.OIL STONE.
BOYD & CHASE,
388 to 406 East 107th st., N. Y.
The largest manufacturers in the world of
Arkansas, Washita and Genuine
Turkey Oil Stone.
Also, Hindostan, Sand and other Stone.
Send for circular. Orders solicited from the trade.EMERY WHEELS AND MACHINERY
Upon which to run the same, of all kinds.EMERY
 DIAMOND
Emery Cloth, Tools,
Mill Stone
EMENT.
Soapstone Register Borders.For particulars, address,
U'ION STONE CO.,
6 Exchange and 26 Devonshire Streets, Boston, Mass.
THE LEHIGH VALLEY
Emery Wheel Co.,
Weissport, Penn.
Manufacturers of
"LEHIGH" Emery
Wheels and Machines.
Send for Circulars.The EUREKA "Perfected"
SELF-ADJUSTINGSimplest, Best and Cheapest Clothes
Wringer in the World.

Steel Elliptic Springs.

T. J. ALEXANDER,
General Agent and Manager,
Office, Oliver St. cor. High, Boston, Mass.Vase Medallion B. Burner.
WITHOUT SMOKE OR SMELL.
Light equal to gas. Adapted to Domestic, Church, Factory or Public Buildings. Breakage of one chimney per week will tax for Lamp for one year. Every Lamp guaranteed for one year. Liberal discounts to trade.
PATENT MECHANICAL LAMP CO., 138 Chambers St., N. Y.E. & F. GLEASON,
Manufacturers of
IMPROVED WOOD TOOLS.
27 Haydock St., Philadelphia.L. COES'
Genuine Improved Patent
SCREW WRENCHES.Manufactured by
L. COES & CO.,
Worcester, Mass.Established
in 1839.
Registered March 23, 1869.We invite the particular attention of the
trade to our New Straight Bar Wrench, widened,
full size of the larger part of the so called
"reinforced or jog bar." Our enlarged jaw,
made with ribs on the inside, having a full
bearing on the front of bar (see sectional view),
making the jaw fully equal to any strain the
bar may be subjected to.These recent improvements in combination
with the nut inside the ferrule firmly screwed
up flush, against square, solid bearings (that
cannot be forced out of place by use), verifies
our claim that we are manufacturing the
strongest Wrench in the market.We would also call attention to the fact,
that in 1869 we made several important im-
provements (secured by patents), on the old
wrench previously manufactured by L. & A.
G. Coes which were at once closely imitated
and sold as the "Genuine Wrench" by certain par-
ties who seem to rely upon our improvements
to keep up their reputation as manufacturers,
and although the fact of their imitating our
goods may be good evidence that we manufac-
ture a superior Wrench, we wish the trade may
not be deceived on the question of originality.
Trusting the trade will fully appreciate our
recent efforts, both in improvements on the
Wrench and in the adoption of a Trade Mark,
we would caution them against imitations.
None genuine unless stamped.

"L. COES & CO."

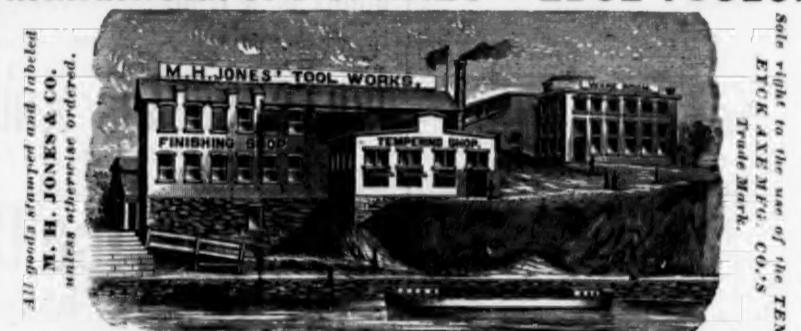
Warehouse, 97 Chambers St., & 81 Reade Sts., N. Y.
HORACE DURRIE & CO., Sole Agents.

M. H. Jones.

A. C. Peck.

M. H. JONES & CO.,
COHOES, Albany Co., N. Y.

Manufacturers of AXES AND EDGE TOOLS.



HORACE DURRIE & CO., Agents, 97 Chambers and 81 Reade Streets, N. Y.



Ausable Horse Nail Co.

MANUFACTURERS OF

HAMMERED,
Hammer Pointed, Polished & Blued
HORSE NAILS,

FROM BENZON IRON.

Orders promptly filled at lowest market rates.

ABRAHAM BUSSING, Secretary,
35 Chambers Street, New York

GLOBE NAIL COMPANY,

MANUFACTURERS OF

Pointed, Polished & Finished Horse Shoe Nails

Recommended by over 20,000 Horse Shoers.

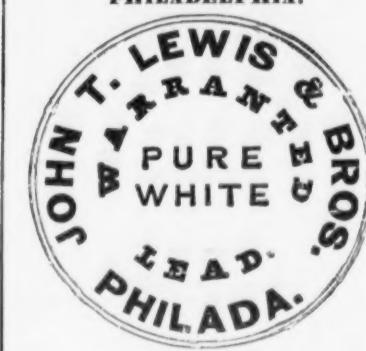
All Nails made from best NORWAY IRON, and warranted perfect and ready
for driving. Orders filled promptly and at lowest rates by

GLOBE NAIL CO. Boston, Mass.

Logan & Strobridge,
PATENT
"Franco-American"
Coffee Mills,
"BRIGHTON"
COFFEE MILLS,
108 Water Street,
PITTSBURGH, PA.

Illustration of a coffee mill.

White Lead, &c.

John T. Lewis & Bros.,
No. 231 South Front St.,
PHILADELPHIA.TRADE MARK.
MANUFACTURERS OF
PURE WHITE LEAD, RED LEAD,
Litharge, Orange Mineral,
Linseed Oil
AND PAINTERS' COLORS.The Atlantic White Lead and Lin-
seed Oil Company,MANUFACTURERS OF
White Lead (Atlantic), Red Lead
Litharge & Linseed Oil.
ROBERT COLGATE & CO.,
287 Pearl Street, New York.

Established A. D. 1777.

WETHERILL & BRO.,

Manufacturers of

White Lead, Red Lead, Litharge & Orange Mineral.

Offices, 31st St. below Chestnut, PHILADELPHIA.

Brooklyn White Lead Co.

JOHN JEWETT & SONS
Manufacturers of the well known Brand of

WHITE LEAD.

TRADE MARK.
White Lead, Red Lead and
Litharge.
89 Malden Lane, NEW YORK.
FISHER HOWE, Treas.TRADE MARK.
Also Manufacturers of
LINSEED OIL
182 Front Street NEW YORKTHE ONLY UPRIGHT STEAM RADIATOR
MADE WHICH HAS A POSITIVE CIRCULATION.

ALSO -

WROUGHT BRASS WORK & CAST
IRON PIPE FOR PLUMBERS, STEAM AND GAS FITTERS.

SEND FOR DESCRIPTIVE CIRCULARS & PRICELISTS

AMERICAN TWIST DRILL CO.,

Woonsocket, R. I., & 15 New Church St., N. Y.

Sole Manufacturers of the celebrated

Diamond Solid Emery Wheel

Prices : 10x1, \$2.90; 14x2, 89³; 18x2¹, \$30.00; 24x3, \$42.00.All other sizes at proportionate prices. State diameter of holes in
your orders for Wheels.

MANUFACTURERS OF

PATENT EMERY WHEEL MACHINERY,

And Automatic Knife Grinders

For the rapid and perfect grinding of Planer, Paper Cutting,

Leather Splitting and other long Knives.

These goods unsurpassed for elegance of design, work-

manship, capacity and durability. First premium awarded by

American Institute, N. Y., 1870 and '75; Medal and Diploma by

M. C. M. A., Boston, 1874.

Fast Cutting-Free from Glazing-It
is the best Solid Emery Wheel.

Diamond Emery Wheel

PAT. SEPT. 21, 1869

Diamond Emery Wheel

Hardware.

SPEAR & JACKSON

Sheffield, England,

MANUFACTURERS OF

Saws, Files, Edge Tools and Steel.

JOHN L. FISHER. Agent

100 Chambers Street, NEW YORK.

ALFRED FIELD & CO.,

Hardware Commission Merchants,

IMPORTERS AND EXPORTERS.

Principal Offices and Warehouses:

Birmingham, Sheffield & Liverpool, England; New York & New Orleans, U. S.

A large line of Birmingham and Sheffield goods in stock at

93 Chambers St., N. Y., & 75 Gravier St., New Orleans.

HERMANN BOKER & CO.,

OFFICES AND WAREHOUSES:

NEW YORK, 101 and 103 Duane and 91 and 93 Thomas Streets.

HEMSCHEID and SOLINGEN (Prussia). H. BOKER & CO.

SHEFFIELD (England), No. 3 Arundel Lane, Represented by Mr. ARTHUR LEE.

LIEGE (Belgium), Represented by Mr. LOUIS MULLER.

Manufacturers and Importers Cutlery, Guns, Hardware and Railroad Material. Proprietors of TRENTON VISE AND TOOL WORKS, TRENTON, N. J.—Vises, Picks, Mattocks, Grub Hoes, Sledges, Hammers, Bridge Work, Turn Tables, etc.

Proprietors of the MANHATTAN CUTLERY CO., "O. K." Razors.

Sole Agents for LAMSON & GOODNOW MFG. CO., Shelburne Falls, Mass.—Table Cutlery and Butcher Knives.

W. & S. Butcher's FILES, Edge Tools and Razors, the largest stock in the United States. Geo. Westenhauer & Son's Knives, Scissors and Razors, the largest stock in the U. S. John Wilson's Butcher and Shoe Knives. Peter Wright's and Armitage Anvils.

We always have on hand a full assortment of German and English Hardware, Cutlery, Guns, Gun Material, Chains, Heavy Goods.

ROY & COMPANY,

West Troy, N. Y.,

Manufacturers of

Wrought Iron Butts, Strap and T Hinges,**PLATE AND HOOK HINGES,**

Cold Pressed Nuts and Washers, Felloe Clips, &c.

CROOKE & CO.,

MANUFACTURERS OF

WROUGHT IRON BUTTS,

All our goods are manufactured from patent faced iron plates; they have a smooth face and bright finish.

163 & 165 Mulberry Street, New York.

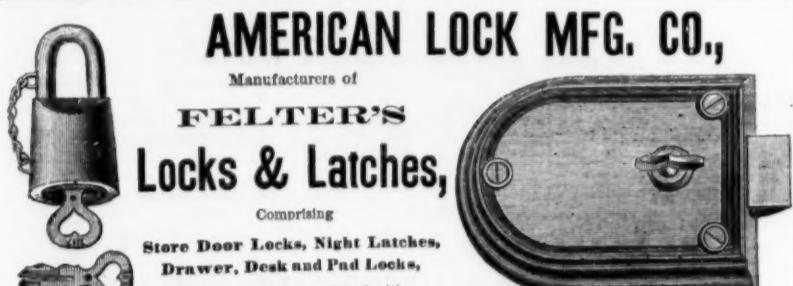
FERNALD & SISE, Agents, 100 Chambers Street, N. Y.

AMERICAN LOCK MFG. CO.,

Manufacturers of

FELTER'S**Locks & Latches,**

Comprising



Store Door Locks, Night Latches, Drawer, Desk and Pad Locks,

All of which are furnished with

SMALL, FLAT, AMERICAN STERLING METAL KEYS,

Which are stronger than steel, and cannot be affected by rust, and will remain bright and clear under all ordinary circumstances.

A candid examination will convince the most unbelieving, that for simplicity, durability, convenience, and safety, they challenge comparison with any now before the public. Being made entirely by new and expensive machinery, especially constructed to manufacture them, they will rival the best made locks in finish and perfect operation.

These locks give perfect satisfaction, because they are the safest, cheapest and most durable lock ever presented to the public, having thirty-five finished Brass Tumblers in each door and twenty-eight in each drawer lock, each one being finely false notched.

Each tumbler bearing on the key at two different points while locking or unlocking, without the aid of spring, which cannot be said of any other patent Tumbler Locks in use.

THE LOCKS ARE FITTED TO THE KEYS,

And not the Keys to the Locks.

Hence Counterfeit Keys cannot be made.

For descriptive list and terms, address,

UNION NUT CO., Sole Agents,

78 Beckman Street, New York.

**CONCORD****AXLES**

Will Run Easier, carry a Larger Load, and Wear Longer than any other Axle in the Market. All GENUINE Concord Axles are stamped with above trade mark. Manufactured only by

D. ARTHUR BROWN & CO., Fisherville, Concord N. H.

JOHN WILSON'S CELEBRATED BUTCHERS' KNIVES, BUTCHERS' STEELS, AND SHOE KNIVES.

GRANTED A.D. 1766, BY THE CORPORATION OF CUTLERS OF SHEFFIELD, AND PROTECTED BY ACT OF PARLIAMENT.

Works 1—SYCAMORE STREET. SHEFFIELD. ESTABLISHED in the Year 1750.

BUYERS ARE SPECIALLY CAUTIONED AGAINST IMITATIONS OF THE MARK, AND THE SUBSTITUTION OF COUNTERFEITS BEARING THE NAME, "WILSON," ONLY.

The TRADE MARK, IN ADDITION TO THE NAME, IS STAMPED UPON EVERY ARTICLE MANUFACTURED BY JOHN WILSON.

The TRADE MARK, IN ADDITION TO THE NAME, IS STAMPED UPON EVERY ARTICLE MANUFACTURED BY JOHN WILSON.

Buyers are specially cautioned against imitations of the mark, and the substitution of counterfeits bearing the name, "Wilson," only.

The TRADE MARK, IN ADDITION TO THE NAME, IS STAMPED UPON EVERY ARTICLE MANUFACTURED BY JOHN WILSON.

Buyers are specially cautioned against imitations of the mark, and the substitution of counterfeits bearing the name, "Wilson," only.

The TRADE MARK, IN ADDITION TO THE NAME, IS STAMPED UPON EVERY ARTICLE MANUFACTURED BY JOHN WILSON.

Buyers are specially cautioned against imitations of the mark, and the substitution of counterfeits bearing the name, "Wilson," only.

The TRADE MARK, IN ADDITION TO THE NAME, IS STAMPED UPON EVERY ARTICLE MANUFACTURED BY JOHN WILSON.

Buyers are specially cautioned against imitations of the mark, and the substitution of counterfeits bearing the name, "Wilson," only.

The TRADE MARK, IN ADDITION TO THE NAME, IS STAMPED UPON EVERY ARTICLE MANUFACTURED BY JOHN WILSON.

Buyers are specially cautioned against imitations of the mark, and the substitution of counterfeits bearing the name, "Wilson," only.

The TRADE MARK, IN ADDITION TO THE NAME, IS STAMPED UPON EVERY ARTICLE MANUFACTURED BY JOHN WILSON.

Buyers are specially cautioned against imitations of the mark, and the substitution of counterfeits bearing the name, "Wilson," only.

The TRADE MARK, IN ADDITION TO THE NAME, IS STAMPED UPON EVERY ARTICLE MANUFACTURED BY JOHN WILSON.

Buyers are specially cautioned against imitations of the mark, and the substitution of counterfeits bearing the name, "Wilson," only.

The TRADE MARK, IN ADDITION TO THE NAME, IS STAMPED UPON EVERY ARTICLE MANUFACTURED BY JOHN WILSON.

Buyers are specially cautioned against imitations of the mark, and the substitution of counterfeits bearing the name, "Wilson," only.

The TRADE MARK, IN ADDITION TO THE NAME, IS STAMPED UPON EVERY ARTICLE MANUFACTURED BY JOHN WILSON.

Buyers are specially cautioned against imitations of the mark, and the substitution of counterfeits bearing the name, "Wilson," only.

The TRADE MARK, IN ADDITION TO THE NAME, IS STAMPED UPON EVERY ARTICLE MANUFACTURED BY JOHN WILSON.

Buyers are specially cautioned against imitations of the mark, and the substitution of counterfeits bearing the name, "Wilson," only.

The TRADE MARK, IN ADDITION TO THE NAME, IS STAMPED UPON EVERY ARTICLE MANUFACTURED BY JOHN WILSON.

Buyers are specially cautioned against imitations of the mark, and the substitution of counterfeits bearing the name, "Wilson," only.

The TRADE MARK, IN ADDITION TO THE NAME, IS STAMPED UPON EVERY ARTICLE MANUFACTURED BY JOHN WILSON.

Buyers are specially cautioned against imitations of the mark, and the substitution of counterfeits bearing the name, "Wilson," only.

The TRADE MARK, IN ADDITION TO THE NAME, IS STAMPED UPON EVERY ARTICLE MANUFACTURED BY JOHN WILSON.

Buyers are specially cautioned against imitations of the mark, and the substitution of counterfeits bearing the name, "Wilson," only.

The TRADE MARK, IN ADDITION TO THE NAME, IS STAMPED UPON EVERY ARTICLE MANUFACTURED BY JOHN WILSON.

Buyers are specially cautioned against imitations of the mark, and the substitution of counterfeits bearing the name, "Wilson," only.

The TRADE MARK, IN ADDITION TO THE NAME, IS STAMPED UPON EVERY ARTICLE MANUFACTURED BY JOHN WILSON.

Buyers are specially cautioned against imitations of the mark, and the substitution of counterfeits bearing the name, "Wilson," only.

The TRADE MARK, IN ADDITION TO THE NAME, IS STAMPED UPON EVERY ARTICLE MANUFACTURED BY JOHN WILSON.

Buyers are specially cautioned against imitations of the mark, and the substitution of counterfeits bearing the name, "Wilson," only.

The TRADE MARK, IN ADDITION TO THE NAME, IS STAMPED UPON EVERY ARTICLE MANUFACTURED BY JOHN WILSON.

Buyers are specially cautioned against imitations of the mark, and the substitution of counterfeits bearing the name, "Wilson," only.

The TRADE MARK, IN ADDITION TO THE NAME, IS STAMPED UPON EVERY ARTICLE MANUFACTURED BY JOHN WILSON.

Buyers are specially cautioned against imitations of the mark, and the substitution of counterfeits bearing the name, "Wilson," only.

The TRADE MARK, IN ADDITION TO THE NAME, IS STAMPED UPON EVERY ARTICLE MANUFACTURED BY JOHN WILSON.

Buyers are specially cautioned against imitations of the mark, and the substitution of counterfeits bearing the name, "Wilson," only.

The TRADE MARK, IN ADDITION TO THE NAME, IS STAMPED UPON EVERY ARTICLE MANUFACTURED BY JOHN WILSON.

Buyers are specially cautioned against imitations of the mark, and the substitution of counterfeits bearing the name, "Wilson," only.

The TRADE MARK, IN ADDITION TO THE NAME, IS STAMPED UPON EVERY ARTICLE MANUFACTURED BY JOHN WILSON.

Buyers are specially cautioned against imitations of the mark, and the substitution of counterfeits bearing the name, "Wilson," only.

The TRADE MARK, IN ADDITION TO THE NAME, IS STAMPED UPON EVERY ARTICLE MANUFACTURED BY JOHN WILSON.

Buyers are specially cautioned against imitations of the mark, and the substitution of counterfeits bearing the name, "Wilson," only.

The TRADE MARK, IN ADDITION TO THE NAME, IS STAMPED UPON EVERY ARTICLE MANUFACTURED BY JOHN WILSON.

Buyers are specially cautioned against imitations of the mark, and the substitution of counterfeits bearing the name, "Wilson," only.

The TRADE MARK, IN ADDITION TO THE NAME, IS STAMPED UPON EVERY ARTICLE MANUFACTURED BY JOHN WILSON.

Buyers are specially cautioned against imitations of the mark, and the substitution of counterfeits bearing the name, "Wilson," only.

The TRADE MARK, IN ADDITION TO THE NAME, IS STAMPED UPON EVERY ARTICLE MANUFACTURED BY JOHN WILSON.

Buyers are specially cautioned against imitations of the mark, and the substitution of counterfeits bearing the name, "Wilson," only.

The TRADE MARK, IN ADDITION TO THE NAME, IS STAMPED UPON EVERY ARTICLE MANUFACTURED BY JOHN WILSON.

Buyers are specially cautioned against imitations of the mark, and the substitution of counterfeits bearing the name, "Wilson," only.

The TRADE MARK, IN ADDITION TO THE NAME, IS STAMPED UPON EVERY ARTICLE MANUFACTURED BY JOHN WILSON.

Buyers are specially cautioned against imitations of the mark, and the substitution of counterfeits bearing the name, "Wilson," only.

The TRADE MARK, IN ADDITION TO THE NAME, IS STAMPED UPON EVERY ARTICLE MANUFACTURED BY JOHN WILSON.

Buyers are specially cautioned against imitations of the mark, and the substitution of counterfeits bearing the name, "Wilson," only.

The TRADE MARK, IN ADDITION TO THE NAME, IS STAMPED UPON EVERY ARTICLE MANUFACTURED BY JOHN WILSON.

Buyers are specially cautioned against imitations of the mark, and the substitution of counterfeits bearing the name, "Wilson," only.

The TRADE MARK, IN ADDITION TO THE NAME, IS STAMPED UPON EVERY ARTICLE MANUFACTURED BY JOHN WILSON.

Buyers are specially cautioned against imitations of the mark, and the substitution of counterfeits bearing the name, "Wilson," only.

The TRADE MARK, IN ADDITION TO THE NAME, IS STAMPED UPON EVERY ARTICLE MANUFACTURED BY JOHN WILSON.

Buyers are specially cautioned against imitations of the mark, and the substitution of counterfeits bearing the name, "Wilson," only.

The TRADE MARK, IN ADDITION TO THE NAME, IS STAMPED UPON EVERY ARTICLE MANUFACTURED BY JOHN WILSON.

Buyers are specially cautioned against imitations of the mark, and the substitution of counterfeits bearing the name, "Wilson," only.

The TRADE MARK, IN ADDITION TO THE NAME, IS STAMPED UPON EVERY ARTICLE MANUFACTURED BY JOHN WILSON.

Buyers are specially cautioned against imitations of the mark, and the substitution of counterfeits bearing the name, "Wilson," only.

The TRADE MARK, IN ADDITION TO THE NAME, IS STAMPED UPON EVERY ARTICLE MANUFACTURED BY JOHN WILSON.

Buyers are specially cautioned against imitations of the mark, and the substitution of counterfeits bearing the name, "Wilson," only.

The TRADE MARK, IN ADDITION TO THE NAME, IS STAMPED UPON EVERY ARTICLE MANUFACTURED BY JOHN WILSON.

Buyers are specially cautioned against imitations of the mark, and the substitution of counterfeits bearing the name, "Wilson," only.

The TRADE MARK, IN ADDITION TO THE NAME, IS STAMPED UPON EVERY ARTICLE MANUFACTURED BY JOHN WILSON.

Buyers are specially cautioned against imitations of the mark, and the substitution of counterfeits bearing the name, "Wilson," only.

The TRADE MARK, IN ADDITION TO THE NAME, IS STAMPED UPON EVERY ARTICLE MANUFACTURED BY JOHN WILSON.

Buyers are specially cautioned against imitations of the mark, and the substitution of counterfeits bearing the name, "Wilson," only.

The TRADE MARK, IN ADDITION TO THE NAME, IS STAMPED UPON EVERY ARTICLE MANUFACTURED BY JOHN WILSON.

Buyers are specially cautioned against imitations of the mark, and the substitution of counterfeits bearing the name, "Wilson," only.

The TRADE MARK, IN ADDITION TO THE NAME, IS STAMPED UPON EVERY ARTICLE MANUFACTURED BY JOHN WILSON.

Buyers are specially cautioned against imitations of the mark, and the substitution of counterfeits bearing the name, "Wilson," only.

The TRADE MARK, IN ADDITION TO THE NAME,



Send for Illustrated Catalogue and Price List
TO
ENTERPRISE MANUFACT'G CO.
PHILADELPHIA, Pa.,
Or to GRAHAM & HAINES, Agents,
88 Chambers St., N. Y.



AWARDED
TO THE
Enterprise Manuf. Co. of Pa.,
PHILADELPHIA,
FOR
AMERICAN
COFFEE, DRUG AND SPICE MILLS,



Measuring
Faucets,
Bung Hole
Borers,
Tobacco
Cutters,
Cheese
Cutters,
Cork
Pressers,
&c., &c.



THE
BEST and CHEAPEST MILLS
IN THE MARKET.



No Extra Charge
FOR
NICKEL-PLATED HOPPERS
WITH
EAGLE DOME TOPS.

WHEELING HINGE CO.,
Wheeling, West Va.,
Manufacturers of

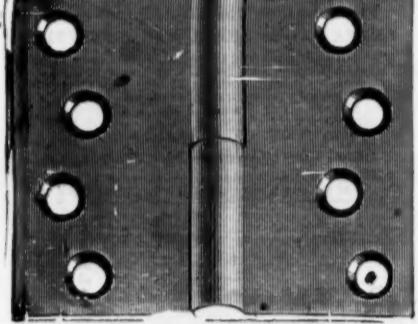
Wrought Butts, Strap & T Hinges, Wrought Hooks,
Hasps & Staples, Wrought Repair
Links & Washers.

GRAHAM & HAINES, Sole Agents, 88 Chambers Street, N. Y.

AMERICAN BUTT CO.,

PROVIDENCE, R. I., Manufacturers of

Cast Butt Hinges,
AND
BUILDERS'
HARDWARE.



New York Warehouse with
Messrs. GRAHAM & HAINES,
No. 88 Chambers Street.
Send for Price List.
All kinds of
SMALL CASTINGS
Made to order.

FRANK H. SCUDER.

GEORGE T. RICHARDSON.
Middleboro' Shovel' Co.,
MANUFACTURERS OF

SHOVELS, SCOOPS & SPADES.



Office and Salesroom,
63 OLIVER STREET,
Works Middleboro, Mass.
J. CLARK WILSON & CO., New York Agents, 81 Beekman Street.

Coal **Hods.**
EXCELSIOR TIN and SHEET IRON WORKS,
Successors to SMITH, BURNS & CO.,
Manufacturers of Plain, Stamped, Galvanized and Japanned

.TIN WARE & SHEET IRON GOODS.
Coal Hods, Fire Shovels, Fry Pans, Water Pails, Well Buckets, &c., &c.

Factory and Warehouse, 47, 49, 51 and 53 South 5th Street, BROOKLYN.

Office and Sample Rooms, 66 Beekman Street, NEW YORK.

From 1841
GREENFIELD TOOL CO.,
Sole Manufacturers of the Celebrated
"Diamond" PLANE IRONS,
1875.
Uniform temper and Warranted.
PATENT FORGED OX SKINS. The only Skins made with concavity to fit hoof. BENCH AND MOULDING PLANES of every description. Also, Plow and Match Bits, Moulding and Rabbet Irons, Plane Stop Cutters, Stars, Plates, &c., &c. Drop Forgings to order. Address for catalogues with stamp.
GREENFIELD TOOL CO., Greenfield, Mass.

COBB & DREW,
Plymouth, Mass.

Manufacturers of Copper, Brass, and Iron Rivets; Common and Swedish Iron; Leather, Carpet, Lace and Gimp Tacks; Finest Hungarian, French, Clout and Clout Box Nails, &c. Rivets made to Order.

NEW YORK AGENCY
Grundy & Kenworthy

HARDWARE.

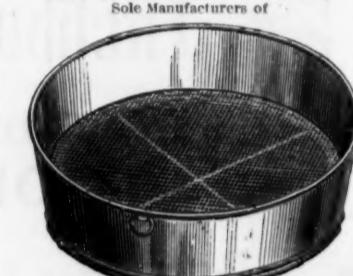
165 Greenwich Street.

Agent for the Philadelphia Star Carriage and Tire Bolts

SAMUEL LORING'S
PLYMOUTH TACK AND RIVET WORKS
PLYMOUTH, MASS., manufacturer of
TACKS, BRADS, NAILS AND
RIVETS.

Swedes and Common Iron Tacks; Leathered, Carpet, Brush, Lace and Gimp Tacks; Hungarian, 3d, 2d and 3d Fine, French, Zinc, Copper, Brass, Zinc, Shoe Nails; Brads and Patent Brads; Glaziers' Points &c., &c. COPPER, BRASS AND IRON RIVETS of all kinds; Copper Rivets, from 1d to 1s in case of 100 lbs. each. Head, Point, and Shoe Ends and Bars. Oval and Counterank Heads of extra lengths, made to order. SHIP AND BOILER RIVETS OF ALL SIZES AND LENGTHS

R. J. MANN & CO.
Sole Manufacturers of



Mann's Patent Metallic Sieve,
24 South Commercial St., St. Louis, Mo.
The best sieve in use. To be had at all dealers.
A full assortment of these goods kept in stock
at 88 Chambers Street, N. Y.

GRAHAM & HAINES, Sole Agents

EUREKA LATHE.



Suitable for Mechanics, Jobbers, Jewelers or Amateurs.
Price \$5; with foot power or pulley, \$15.

POPE BROS., Manufacturers
43 High Street, Boston, Mass.
Liberal discount to the trade.
Also manufacturers of the **RIFLE AIR PISTOL.**

SOLE AGENTS IN NEW YORK.

MOWAT, MASTERS & ANDREWS,
AM. TEA TRAY WORKS,
GREENWICH, N. Y.

TIFFIT & HOWARD, 12 MURRAY ST.

SOLE AGENTS IN NEW YORK.

J. F. GREEN & BRO.
Manufacturers of Family Grindstones,
HAVERSTRAW, N. Y.

TIFFT & HOWARD, 12 MURRAY ST.

TIFFT & HOWARD, 12 MURRAY ST.

SOLE AGENTS IN NEW YORK.

J. F. GREEN & BRO.

Manufacturers of Family Grindstones,

HAVERSTRAW, N. Y.

TIFFT & HOWARD, 12 MURRAY ST.

TIFFT &

Steel.

THREE
CLASS PRIZE MEDALS.
CLASSES 1, 21, 22,
so EXHIBITION OF INDUSTRY
LONDON, 1851

MEDAL OF HONOUR,
SOCIETY OF ARTS & INDUSTRY,
LONDON, 1856.

1st CLASS
PRIZE MEDAL, CLASS 18
UNIVERSAL
EXHIBITION OF INDUSTRY
PARIS, 1855.

COCKER BROTHERS
SUCCESSORS TO
SAM'L COCKER & SON,
(Established 1752.)
SHEFFIELD, ENGLAND

MANUFACTURERS OF
CAST, WIRE, SHEET, AND BLISTER STEEL, OF EVERY DESCRIPTION.
BEST CAST STEEL WIRE, ADAPTED SPECIALLY FOR MECHANICAL PURPOSES;
Also for ROPE, NEEDLES, FISH HOOKS, PINS, CRINOLINE, &c.
BEST CAST STEEL FILES, SAWS, EDGE TOOLS,
HACKLES, GILLS, CARD CLOTHING, CARD TEETH, HACKLE AND GILL PINS,
FISH HOOKS, NEEDLES, &c.

ALSO

GENERAL MERCHANTS.
Agent, JONATHAN HATTERSLEY, Cincinnati, O.

WM. JESSOP & SONS,
MANUFACTURERS OF
STEEL,
AND IMPORTERS OF IRON
SHEFFIELD, ENGLAND.

PRINCIPAL DEPOTS:
W YORK, Nos. 1 & 93 John Street..... BOSTON, No. 141 Federal.
ST. LOUIS, No. 714 North Second Street.
AGENCIES

PHILADELPHIA, Jas. C. Hand & Co. PROVIDENCE, Nightingale & Kilton.
CHICAGO, Crerar, Adams & Co. NEW ORLEANS, Folger & Co.
CINCINNATI, Augustus Wessel. SAN FRANCISCO, Huntington, Hopkins & Co.

F. W. MOSS,

Successor to JOSHUA A. MOSS & GAMBLE BROS.
WADSWELL BRIDGE WORKS, SHEFFIELD, ENGLAND.
WALKLEY WORKS, MANUFACTURER AND IMPORTER OF

STEEL AND FILES.

Principal Depots: 80 John St., N.Y., and 512 Commerce St., Phila.
MOSS & GAMBLE SUPERIOR C. S. "FULL WEIGHT" FILES,
Cast Steel Hammers and Sledges. Also, "M. & G." Anvils and Vises.
WARRANTED CAST STEEL especially adapted for DIES and TURNING TOOLS, DRILLS, COLD CHISELS,
PUNCHES, all kinds of MACHINE-TOOLS.
Also Importers of Sheet Cast Steel for Axes, Reamers, and Milling Tools,
warranted not to crack in hardening. Tape of any size.
Swede Spring Steel, especially adapted to Locomotive and Railway Car Springs.
English Spring and Plow Plate Steel. Also, manufacturer of
Sheet Cast Steel, Shear, German, Round Machinery, Hammer, Fork and Shovel Steel
And GENERAL MERCHANT.
A. M. F. WATSON, General Agent.

WILSON HAWKSWORTH, ELLISON & CO.,
MANUFACTURERS OF
STEEL, STEEL WIRE, &c.,
AND GENERAL MERCHANTS.

CARLISLE WORKS, SHEFFIELD, ENGLAND.
AGENCIES

New York, 72 John Street.
Philadelphia, 505 Commerce Street.
Boston, 21 Oliver Street.
New Orleans, La., III Gravier St.

Isaac Jenks & Sons,
MINERVA AND BEAVER WORKS, WOLVERHAMPTON, ENGLAND.
MANUFACTURERS OF
"JENKS" SPRING STEEL, "MINERVA" SWEDES, AND "ANGLO" CAST SPRING STEEL;
"JENKS" TIRE, TOE CORK, SLEIGH SHOE, BLISTER, AND PLOW STEEL;
ALSO,
"BEAVER" PLOW, TIRE, AXE, AND SHEET IRON.
VAN WART & MCCOY, Agents, 134 & 136 Chambers Street, N.Y.

J. & RILEY CARR,
MANUFACTURERS OF SUPERIOR
STEEL

For Tools, Cutlery, Saws, Files, Augers, Gimblets, &c.; Sheet Cast Steel for
SPRINGS AND STAMPING COLD;

ALSO THE CELEBRATED

DOG BRAND FILES.

Unsurpassed, if equalled in quality.

Pailey Lane Works, Sheffield, England.
Warehouse, 62 John St., New York.

Established 1810.



HENRY MOORE, Attorney.

Steel.

SANDERSON BROTHERS & COMPANY,
(LIMITED)

DARNALL WORKS, ATTERCLIFFE FORGE, SHEFFIELD, ENGLAND.

Sole Manufacturers of the CELEBRATED

CAST STEEL,

Warranted most SUPERIOR and UNSURPASSED for
TOOLS and GRANITE ROCK DRILLS.

A full assortment of this universally approved OLD BRAND of
English Steel, and

ARMITAGE'S GENUINE MOUSEHOLE ANVILS,

For Sale by

EDWARD FRITH, 16 Cliff Street, New York.

FRANCIS HOBSON & SON,
97 John Street, NEW YORK,

Sole Manufact'rs of "**CHOICE**" Extra Cast Steel.

Manufacturers of all Descriptions of Steel.

Manufacturers of Every Kind of Steel Wire.

Don Works, Sheffield, England.

JOHN HOGAN, Agent.

S. & C. WARDLOW,

MANUFACTURERS OF THE CELEBRATED

**Cast and Double Shear
STEEL,**

In Bars, Sheets and Coils, for fine Pen and Pocket Cutlery, Table, Carving, Butcher and Shoe Knives, Turning Tools, Dies, Files, Clock or other Springs, Saws and Tools of every variety.

SHEFFIELD, ENGLAND.

Office of S. & C. WARDLOW, 95 John Street, New York.

In calling the attention of consumers of Steel in
any of the various above named articles, we would respectfully advise
that our ability to supply an article, that cannot be supplied in
quality, temper, and adaptation in all respects to the various surfaces
for which it may be required. Half a century of practical experience
in all departments of Steel manufacture, a long established
reputation in England, and the Continent of Europe, and in the Eastern
States principally of this Country, encourage us to solicit a universal
trial of our Steel for the above or other purposes for which a first
class material, in quality, temper, and durability, is needed.

G. SANDERSON & CO.,

Manufacturers of all descriptions of

STEEL.

Bailey Street and Broad Lane Steel Works, SHEFFIELD, ENGLAND.

Particular attention is paid to quality and temper for

Files, Saws, Table and Pocket Cutlery, Augers, Shovels, &c.

ALSO STEEL of superior quality for Turning Tools, Taps, Dies, Drills, &c.

Hot and Cold Rolled Sheets for Clock Springs, Corset Clasps, Pens, &c.

Makers of the Celebrated ROCK BORING DRILL STEEL.

Warehouse, 57 John Street, New York.

BARROW HÆMATITE STEEL COMPANY,
LIMITED.

BARROW IN FURNESS,
LANCASHIRE, ENGLAND.

MANUFACTURERS OF

Steel Rails, Tyres, Wheels,

Axes, Shafting, Boiler & Ship Plates, Bessemer Pig Iron, etc., etc.

CHAS. CONGREVE & SON,

Sole Agents for the United States,

104 & 106 John Street, opposite Cliff Street, NEW YORK.

D. G. GAUTIER & CO.,

MANUFACTURERS OF

Hammered and Rolled STEEL of every description
JERSEY CITY, NEW JERSEY.

DUDLEY G. GAUTIER.

JOSIAH H. GAUTIER.

CHROME STEEL COMPANY,
MANUFACTURERS OF

CHROME CAST STEEL,

WARRANTED SUPERIOR TO ANY STEEL IN THE MARKET—EITHER ENGLISH OR AMERICAN—
FOR EVERY PURPOSE.

Principal Office & Works, Kent Ave. and Keep St., Brooklyn, E. D., N. Y.
AGENCIES,

Kimbark Bros. & Co., Chicago, Illa.
Huntington, Hopkins & Co., San Francisco and
Sacramento, Cal.
M. M. Buck & Co., St. Louis, Mo.

Potter & Hoffman, Philadelphia, Pa.
Geo. Dunbar & Co., Boston, Mass.
Wood & Legget, Hamilton, Ont.

WILLIAM TOOKE, Genl. Sales Agent, 110 Liberty St., N. Y. City.

Site, May 20, 1875.

Sheffield Steel Works,

(Established in 1848.)

SINGER, NIMICK & CO.

Pittsburgh, Pa.,

Manufacturers of Extra Quality Tool

CAST STEEL,
Patent Rolled

SAW PLATES,
All descriptions of Cast and German

Spring and Plow Steel

Elliptic and Side Springs, Seat Springs,

AXLES, STEEL TIRE,

Plow Wings, Shares, Cultivators,
Reaper Bars, Scare Bars, &c., &c.,
Warehouse, 83 Water and 100 First Streets.

MILLER, BARR & PARKIN,
Crescent Steel Works,

PITTSBURGH, PA.

Manufacturers of all descriptions of

STEEL

EQUAL TO ANY IN THE MARKET.

Office 339 Liberty St.

PITTSBURGH, PA.

Gunpowder.

GUNPOWDER

DUPONT'S

Sporting, Shipping, and Mining

POWDER.

DUPONT'S GUNPOWDER MILLS

ESTABLISHED IN 1801,

Have maintained their great reputation

years. Manufacture the

Celebrated Eagle Ducking, Eagle Rifle,
and Diamond Grain Powder.

Also, SPORTING, MINING, SHIPPING, AND BLAST-

ING POWDER.

of all kinds and descriptions.

For sale in all parts of the country. Represented by

F. L. KNEELAND

70 Wall Street, NEW YORK.

GUN-POWDER

LAFLIN & RAND POWDER CO.

21 Park Row, New York,

invite the attention of the Hardware Trade to
their facilities for delivering

BLASTING, MINING and RIFLE

POWDER

IN EVERY PART OF THE UNITED STATES
from having agencies and magazines at all prominent
points, beside our works at

Newburg, Saugerties, Kingston, and
Catskill, N. Y.; Scranton, Carbon-
dale and Pittsville, Pa.; Baltimore,
Md., and Plattsburgh, Wis.

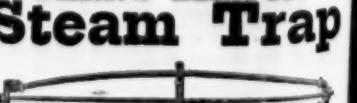
The superiority is well known of our brand
Rifle Powder

Orange Rifle, Orange Ducking
Lightning, Audubon.

SAFETY-FUSE at wholesale.

BARR'S ELLIPTIC

Steam Trap



THE BEST IN THE WORLD
SEND FOR A CIRCULAR
Richards & Pike,
205 LEDGER PLACE, Philadelphia

GRAHAM BROS.

London and Stockholm.

Engineers, Anglo-Swedish Merchants

And Engineers' Agents.

First-class Makers of Machinery & Specialties
&c., desirous of extending their exports, will find it
their interest to supply us with full particulars on
prices, &c., &c.

London—122 Cannon Street, E.C.

FORT PITT STEEL WORKS

JO

Rai

Steel.

HUSSEY, WELLS & CO.

MANUFACTURERS OF ALL DESCRIPTIONS OF

CAST STEEL,

INCLUDING

Best Refined Steel for Edge Tools.

PARTICULAR ATTENTION PAID TO THE MANUFACTURE OF STEEL FOR

Railroad Supplies, Homogeneous Plates

FOR LOCOMOTIVES, BOILERS AND FIRE BOXES,

Smoke-Stack Steel, Cast Steel Forgings for Crank Pins, Car Axles, &c.

ALSO, MANUFACTURERS OF THE CELEBRATED BRAND

"Hussey, Wells & Co. Cast Spring Steel,"

For Elliptic Springs for Railroad Cars & Locomotives.

PENN AND SEVENTEENTH STS., PITTSBURGH, PA.

BRANCH OFFICES:

30 Gold St., New York. 13 & 15 Custom House St., Boston. 146 E. Lake St., Chicago.

Pittsburgh Steel Works.

ESTABLISHED IN 1845.

ANDERSON & WOODS,

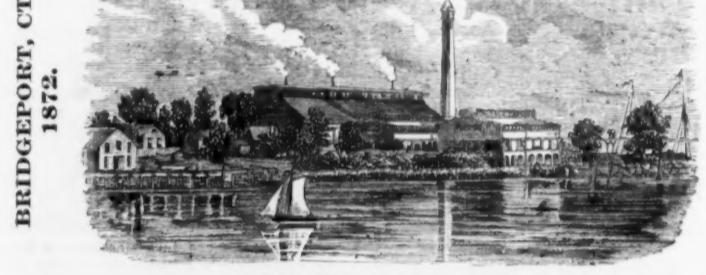
MANUFACTURERS OF

BEST REFINED CAST STEEL,**Cast and German Plow and Spring Steel,**
FIRST AVE., AND ROSS ST., PITTSBURGH.

BRANCH HOUSES

LOTHROP & CO., 16 Hamilton St., Boston. A. B. PARKER, 12 Cliff Street, New York.

W. F. POTTS, SON & CO., 125 Market Street, Philadelphia.

FARIST & WINDSOR,WINDSOR LOCKS, CT.
1860.

[ALL DESCRIPTIONS OF

CAST STEEL

made to order for Cutlery, Dies, Agricultural Implements, Decarbonized Steel, Frog Plates and Points, Steel Forgings to Pattern. Quality equal to the best.

JOEL FARIST.

Prices as low as the market admits.

JOHN B. WINDSOR.

LABELLE STEEL WORKS.**SMITH, SUTTON & CO.,**

MANUFACTURERS OF ALL KINDS OF

STEEL.

Also, Springs, Axles, Rake Teeth, &c.

OFFICE & WORKS, Ridge, Lighthill & Belmont Sts., & Ohio River, Allegheny, Post Office Address, Pittsburgh, Pa.



Reese, Graft & Woods.

JOHN A. GRISWOLD & CO.,
TROY, N. Y.,

Office in New York City, 56 BROADWAY.

MANUFACTURERS OF

Bessemer Railway Steel,
MERCHANT BARS, TIRE AND SHAFTING,

Railroad Iron, Pig Iron, Merchant and Ship Iron,

AGENCIES IN BOSTON AND PHILADELPHIA.

Chain.**New England Chain Works**271 Eddy Street, Providence, R. I.
Manufacture Iron Chain of every description,
Mowing Machine, Crane, Break
Draft Chains, &c., &c.
Also, Latest Improved Cotton Can Rings.
THOS. WYATT, Proprietor.**BUFFALO****Bellows Factory and
Planing Mill.**

ESTABLISHED 1852.

**JOSEPH CHURCHYARD,
Contractor, Builder
AND****Manufacturer,
CLINTON, cor. ADAMS STS.,
Buffalo, N. Y.****SASH, BLINDS, DOORS,**Cisterns, Tanks, Stairs, Hand Rail, Newels, Mirror
Frames, Mantel, Curtain Cornices, Book Cases,
Veneered Doors, Mouldings, and complete interior
and exterior finish for houses.**ROUGH AND PLANED LUMBER,**
Flooring, Siding, Shingles, Lath and Fence Posts.**Blacksmiths' & Moulder's Bellows.**
TUCKER & DORSEY

MANUFACTURERS.

Indianapolis, Ind.



BOSTON.

(Reported by Macomber, Bigelow & Dowse, 156 to 164 Oliver St.)

Anglers.—Watrous Ship.....
A. H. Hammon's Ship.....
Ax.—Forest, favorite, Bronzed.....
Excelsior, Black.....
Chopper's Print, Bronzed.....
Lodging, Black, Bronzed.....
Red Cross, Handled.....
Boy's Handled Blue Jackets.....
Axe Handles—Wedgworth's Oak—
A. H. Hammon's No. 1 \$2.00. C (No. 1) \$2.00. U (No. 2) \$1.50 per dozHells, Sleigh—
Fancy Body, Patent Leather, Cloth Bound, White Metal, No. 1.....
Genuine Patent Leather, Cloth Bound, White Metal, No. 1.....
Fancy Body, Patent Leather, Leather Bound, Extra Tinned, No. 1.....
Fancy Body, Patent Leather, Leather Bound, Silver Plated, No. 1.....
Fancy Body, Patent Leather, Leather Bound, Silver Plated, No. 2.....
Shaft, Strap, White Metal, House Bells, extra, 6, No. 1.....
Globe, No. 1.....
Bell Hinges—
Orr or Washburn's.....
Blind Hinges—
Fancy Body, Patent Leather, Cloth Bound, White Metal, No. 1.....
Fancy Body, Patent Leather, Leather Bound, Extra Tinned, No. 1.....
Fancy Body, Patent Leather, Leather Bound, Silver Plated, No. 1.....
Shaft, Strap, White Metal, House Bells, extra, 6, No. 1.....
Globe, No. 1.....
Bell Hinges—
Orr or Washburn's.....
Blind Hinges—
Fancy Body, Patent Leather, Cloth Bound, White Metal, No. 1.....
Fancy Body, Patent Leather, Leather Bound, Extra Tinned, No. 1.....
Fancy Body, Patent Leather, Leather Bound, Silver Plated, No. 1.....
Shaft, Strap, White Metal, House Bells, extra, 6, No. 1.....
Globe, No. 1.....
Bell Hinges—
Orr or Washburn's.....
Blind Hinges—
Fancy Body, Patent Leather, Cloth Bound, White Metal, No. 1.....
Fancy Body, Patent Leather, Leather Bound, Extra Tinned, No. 1.....
Fancy Body, Patent Leather, Leather Bound, Silver Plated, No. 1.....
Shaft, Strap, White Metal, House Bells, extra, 6, No. 1.....
Globe, No. 1.....
Bell Hinges—
Orr or Washburn's.....
Blind Hinges—
Fancy Body, Patent Leather, Cloth Bound, White Metal, No. 1.....
Fancy Body, Patent Leather, Leather Bound, Extra Tinned, No. 1.....
Fancy Body, Patent Leather, Leather Bound, Silver Plated, No. 1.....
Shaft, Strap, White Metal, House Bells, extra, 6, No. 1.....
Globe, No. 1.....
Bell Hinges—
Orr or Washburn's.....
Blind Hinges—
Fancy Body, Patent Leather, Cloth Bound, White Metal, No. 1.....
Fancy Body, Patent Leather, Leather Bound, Extra Tinned, No. 1.....
Fancy Body, Patent Leather, Leather Bound, Silver Plated, No. 1.....
Shaft, Strap, White Metal, House Bells, extra, 6, No. 1.....
Globe, No. 1.....
Bell Hinges—
Orr or Washburn's.....
Blind Hinges—
Fancy Body, Patent Leather, Cloth Bound, White Metal, No. 1.....
Fancy Body, Patent Leather, Leather Bound, Extra Tinned, No. 1.....
Fancy Body, Patent Leather, Leather Bound, Silver Plated, No. 1.....
Shaft, Strap, White Metal, House Bells, extra, 6, No. 1.....
Globe, No. 1.....
Bell Hinges—
Orr or Washburn's.....
Blind Hinges—
Fancy Body, Patent Leather, Cloth Bound, White Metal, No. 1.....
Fancy Body, Patent Leather, Leather Bound, Extra Tinned, No. 1.....
Fancy Body, Patent Leather, Leather Bound, Silver Plated, No. 1.....
Shaft, Strap, White Metal, House Bells, extra, 6, No. 1.....
Globe, No. 1.....
Bell Hinges—
Orr or Washburn's.....
Blind Hinges—
Fancy Body, Patent Leather, Cloth Bound, White Metal, No. 1.....
Fancy Body, Patent Leather, Leather Bound, Extra Tinned, No. 1.....
Fancy Body, Patent Leather, Leather Bound, Silver Plated, No. 1.....
Shaft, Strap, White Metal, House Bells, extra, 6, No. 1.....
Globe, No. 1.....
Bell Hinges—
Orr or Washburn's.....
Blind Hinges—
Fancy Body, Patent Leather, Cloth Bound, White Metal, No. 1.....
Fancy Body, Patent Leather, Leather Bound, Extra Tinned, No. 1.....
Fancy Body, Patent Leather, Leather Bound, Silver Plated, No. 1.....
Shaft, Strap, White Metal, House Bells, extra, 6, No. 1.....
Globe, No. 1.....
Bell Hinges—
Orr or Washburn's.....
Blind Hinges—
Fancy Body, Patent Leather, Cloth Bound, White Metal, No. 1.....
Fancy Body, Patent Leather, Leather Bound, Extra Tinned, No. 1.....
Fancy Body, Patent Leather, Leather Bound, Silver Plated, No. 1.....
Shaft, Strap, White Metal, House Bells, extra, 6, No. 1.....
Globe, No. 1.....
Bell Hinges—
Orr or Washburn's.....
Blind Hinges—
Fancy Body, Patent Leather, Cloth Bound, White Metal, No. 1.....
Fancy Body, Patent Leather, Leather Bound, Extra Tinned, No. 1.....
Fancy Body, Patent Leather, Leather Bound, Silver Plated, No. 1.....
Shaft, Strap, White Metal, House Bells, extra, 6, No. 1.....
Globe, No. 1.....
Bell Hinges—
Orr or Washburn's.....
Blind Hinges—
Fancy Body, Patent Leather, Cloth Bound, White Metal, No. 1.....
Fancy Body, Patent Leather, Leather Bound, Extra Tinned, No. 1.....
Fancy Body, Patent Leather, Leather Bound, Silver Plated, No. 1.....
Shaft, Strap, White Metal, House Bells, extra, 6, No. 1.....
Globe, No. 1.....
Bell Hinges—
Orr or Washburn's.....
Blind Hinges—
Fancy Body, Patent Leather, Cloth Bound, White Metal, No. 1.....
Fancy Body, Patent Leather, Leather Bound, Extra Tinned, No. 1.....
Fancy Body, Patent Leather, Leather Bound, Silver Plated, No. 1.....
Shaft, Strap, White Metal, House Bells, extra, 6, No. 1.....
Globe, No. 1.....
Bell Hinges—
Orr or Washburn's.....
Blind Hinges—
Fancy Body, Patent Leather, Cloth Bound, White Metal, No. 1.....
Fancy Body, Patent Leather, Leather Bound, Extra Tinned, No. 1.....
Fancy Body, Patent Leather, Leather Bound, Silver Plated, No. 1.....
Shaft, Strap, White Metal, House Bells, extra, 6, No. 1.....
Globe, No. 1.....
Bell Hinges—
Orr or Washburn's.....
Blind Hinges—
Fancy Body, Patent Leather, Cloth Bound, White Metal, No. 1.....
Fancy Body, Patent Leather, Leather Bound, Extra Tinned, No. 1.....
Fancy Body, Patent Leather, Leather Bound, Silver Plated, No. 1.....
Shaft, Strap, White Metal, House Bells, extra, 6, No. 1.....
Globe, No. 1.....
Bell Hinges—
Orr or Washburn's.....
Blind Hinges—
Fancy Body, Patent Leather, Cloth Bound, White Metal, No. 1.....
Fancy Body, Patent Leather, Leather Bound, Extra Tinned, No. 1.....
Fancy Body, Patent Leather, Leather Bound, Silver Plated, No. 1.....
Shaft, Strap, White Metal, House Bells, extra, 6, No. 1.....
Globe, No. 1.....
Bell Hinges—
Orr or Washburn's.....
Blind Hinges—
Fancy Body, Patent Leather, Cloth Bound, White Metal, No. 1.....
Fancy Body, Patent Leather, Leather Bound, Extra Tinned, No. 1.....
Fancy Body, Patent Leather, Leather Bound, Silver Plated, No. 1.....
Shaft, Strap, White Metal, House Bells, extra, 6, No. 1.....
Globe, No. 1.....
Bell Hinges—
Orr or Washburn's.....
Blind Hinges—
Fancy Body, Patent Leather, Cloth Bound, White Metal, No. 1.....
Fancy Body, Patent Leather, Leather Bound, Extra Tinned, No. 1.....
Fancy Body, Patent Leather, Leather Bound, Silver Plated, No. 1.....
Shaft, Strap, White Metal, House Bells, extra, 6, No. 1.....
Globe, No. 1.....
Bell Hinges—
Orr or Washburn's.....
Blind Hinges—
Fancy Body, Patent Leather, Cloth Bound, White Metal, No. 1.....
Fancy Body, Patent Leather, Leather Bound, Extra Tinned, No. 1.....
Fancy Body, Patent Leather, Leather Bound, Silver Plated, No. 1.....
Shaft, Strap, White Metal, House Bells, extra, 6, No. 1.....
Globe, No. 1.....
Bell Hinges—
Orr or Washburn's.....
Blind Hinges—
Fancy Body, Patent Leather, Cloth Bound, White Metal, No. 1.....
Fancy Body, Patent Leather, Leather Bound, Extra Tinned, No. 1.....
Fancy Body, Patent Leather, Leather Bound, Silver Plated, No. 1.....
Shaft, Strap, White Metal, House Bells, extra, 6, No. 1.....
Globe, No. 1.....
Bell Hinges—
Orr or Washburn's.....
Blind Hinges—
Fancy Body, Patent Leather, Cloth Bound, White Metal, No. 1.....
Fancy Body, Patent Leather, Leather Bound, Extra Tinned, No. 1.....
Fancy Body, Patent Leather, Leather Bound, Silver Plated, No. 1.....
Shaft, Strap, White Metal, House Bells, extra, 6, No. 1.....
Globe, No. 1.....
Bell Hinges—
Orr or Washburn's.....
Blind Hinges—
Fancy Body, Patent Leather, Cloth Bound, White Metal, No. 1.....
Fancy Body, Patent Leather, Leather Bound, Extra Tinned, No. 1.....
Fancy Body, Patent Leather, Leather Bound, Silver Plated, No. 1.....
Shaft, Strap, White Metal, House Bells, extra, 6, No. 1.....
Globe, No. 1.....
Bell Hinges—
Orr or Washburn's.....
Blind Hinges—
Fancy Body, Patent Leather, Cloth Bound, White Metal, No. 1.....
Fancy Body, Patent Leather, Leather Bound, Extra Tinned, No. 1.....
Fancy Body, Patent Leather, Leather Bound, Silver Plated, No. 1.....
Shaft, Strap, White Metal, House Bells, extra, 6, No. 1.....
Globe, No. 1.....
Bell Hinges—
Orr or Washburn's.....
Blind Hinges—
Fancy Body, Patent Leather, Cloth Bound, White Metal, No. 1.....
Fancy Body, Patent Leather, Leather Bound, Extra Tinned, No. 1.....
Fancy Body, Patent Leather, Leather Bound, Silver Plated, No. 1.....
Shaft, Strap, White Metal, House Bells, extra, 6, No. 1.....
Globe, No. 1.....
Bell Hinges—
Orr or Washburn's.....
Blind Hinges—
Fancy Body, Patent Leather, Cloth Bound, White Metal, No. 1.....
Fancy Body, Patent Leather, Leather Bound, Extra Tinned, No. 1.....
Fancy Body, Patent Leather, Leather Bound, Silver Plated, No. 1.....
Shaft, Strap, White Metal, House Bells, extra, 6, No. 1.....
Globe, No. 1.....
Bell Hinges—
Orr or Washburn's.....
Blind Hinges—
Fancy Body, Patent Leather, Cloth Bound, White Metal, No. 1.....
Fancy Body, Patent Leather, Leather Bound, Extra Tinned, No. 1.....
Fancy Body, Patent Leather, Leather Bound, Silver Plated, No. 1.....
Shaft, Strap, White Metal, House Bells, extra, 6, No. 1.....
Globe, No. 1.....
Bell Hinges—
Orr or Washburn's.....
Blind Hinges—
Fancy Body, Patent Leather, Cloth Bound, White Metal, No. 1.....
Fancy Body, Patent Leather, Leather Bound, Extra Tinned, No. 1.....
Fancy Body, Patent Leather, Leather Bound, Silver Plated, No. 1.....
Shaft, Strap, White Metal, House Bells, extra, 6, No. 1.....
Globe, No. 1.....
Bell Hinges—
Orr or Washburn's.....
Blind Hinges—
Fancy Body, Patent Leather, Cloth Bound, White Metal, No. 1.....
Fancy Body, Patent Leather, Leather Bound, Extra Tinned, No. 1.....
Fancy Body, Patent Leather, Leather Bound, Silver Plated, No. 1.....
Shaft, Strap, White Metal, House Bells, extra, 6, No. 1.....
Globe, No. 1.....
Bell Hinges—
Orr or Washburn's.....
Blind Hinges—
Fancy Body, Patent Leather, Cloth Bound, White Metal, No. 1.....
Fancy Body, Patent Leather, Leather Bound, Extra Tinned, No. 1.....
Fancy Body, Patent Leather, Leather Bound, Silver Plated, No. 1.....
Shaft, Strap, White Metal, House Bells, extra, 6, No. 1.....
Globe, No. 1.....
Bell Hinges—
Orr or Washburn's.....
Blind Hinges—
Fancy Body, Patent Leather, Cloth Bound, White Metal, No. 1.....
Fancy Body, Patent Leather, Leather Bound, Extra Tinned, No. 1.....
Fancy Body, Patent Leather, Leather Bound, Silver Plated, No. 1.....
Shaft, Strap, White Metal, House Bells, extra, 6, No. 1.....
Globe, No. 1.....
Bell Hinges—
Orr or Washburn's.....
Blind Hinges—
Fancy Body, Patent Leather, Cloth Bound, White Metal, No. 1.....
Fancy Body, Patent Leather, Leather Bound, Extra Tinned, No. 1.....
Fancy Body, Patent Leather, Leather Bound, Silver Plated, No. 1.....
Shaft, Strap, White Metal, House Bells, extra, 6, No. 1.....
Globe, No. 1.....
Bell Hinges—
Orr or Washburn's.....
Blind Hinges—
Fancy Body, Patent Leather, Cloth Bound, White Metal, No. 1.....
Fancy Body, Patent Leather, Leather Bound, Extra Tinned, No. 1.....
Fancy Body, Patent Leather, Leather Bound, Silver Plated, No. 1.....
Shaft, Strap, White Metal, House Bells, extra, 6, No. 1.....
Globe, No. 1.....
Bell Hinges—
Orr or Washburn's.....
Blind Hinges—
Fancy Body, Patent Leather, Cloth Bound, White Metal, No. 1.....
Fancy Body, Patent Leather, Leather Bound, Extra Tinned, No. 1.....
Fancy Body, Patent Leather, Leather Bound, Silver Plated, No. 1.....
Shaft, Strap, White Metal, House Bells, extra, 6, No. 1.....
Globe, No. 1.....
Bell Hinges—
Orr or Washburn's.....
Blind Hinges—
Fancy Body, Patent Leather, Cloth Bound, White Metal, No. 1.....
Fancy Body, Patent Leather, Leather Bound, Extra Tinned, No. 1.....
Fancy Body, Patent Leather, Leather Bound, Silver Plated, No. 1.....
Shaft, Strap, White Metal, House Bells, extra, 6, No. 1.....
Globe, No. 1.....
Bell Hinges—
Orr or Washburn's.....
Blind Hinges—



TO ALL WHO USE STEAM-POWER!

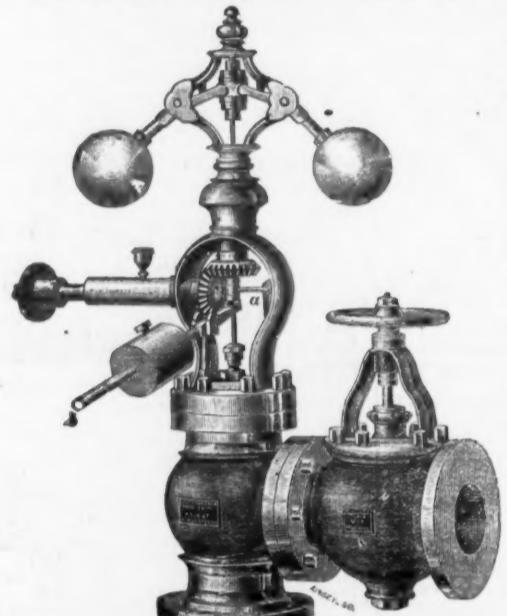
We will put our Governor on any Engine, and guarantee it to prove itself superior to all others.

If, after a fair trial, it does not, we will take it off at our own expense.

Shive Governor Co.
BETHLEHEM, PA.

ALSO,
SHIVE'S PATENT WATCHMAN'S CLOCK AND DETECTOR.
The Best and Cheapest Watcher of the Watchman made
PRICE ONLY \$15.
Circulars sent free.

February 10, 1875. REDUCED PRICE LIST OF THE JUDSON PATENT IMPROVED GOVERNORS.



W. Governors are ordered, be particular and say Governor with Stop Valve, or without Stop Valve; and either Black, Finished or Portable, as you may require, and with or without Lever Attachment.

For dimensions and other particulars send for Illustrated List.

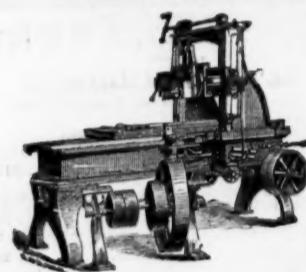
Capacity of Valve or Pipe in inches.	Price, Black.	Price, Bright Finish.	Price, Portable.	Price of Lever Attachment, in feet per minute.	Price of Stop Valve.
18/00	20/00	20/00	17/00
20/00	22/00	19/00
21/00	27/00	22/00	2/01	5/25	..
29/00	32/00	27/00	2/25	6/64	..
31/00	38/00	31/00	2/50	8/50	..
41/00	46/00	39/00	2/75	11/50	..
47/00	51/00	..	3/25	16/00	..
50/00	57/00	47/00	3/50	17/00	..
53/00	60/00	..	3/75	19/00	..
62/00	70/00	..	3/25	26/00	..
71/00	80/00	..	4/50	27/00	..
81/00	92/00	..	5/10	32/00	..
91/00	108/00	..	5/50	37/00	..
102/00	114/00	..	6/00	42/00	..
116/00	128/00	..	6/50	48/00	..
6	134/00	148/00	7/00	55/00	..
7	169/00	176/00	8/00	69/00	..
8	199/00	219/00	9/40	83/00	..
9	300/00	355/00	No Larger than 25 in.	10/00	..

No Charge for Boxing & Carting.

It is a common method to advertise Governors *without cost*, unless satisfactory to the customer, and then charge *High Prices* for doing what any good Governor will do. Various Governors inferior to the "Judson" are sold in this way, operating well enough for three months, to insure collection of the pay, but becoming useless after a year's wear—their construction lacking durability. The Judson Governor is guaranteed to be not only the best Regulator of Steam Engines, but also the most durable Governor made. Parties in buying other Governors should stipulate that their durability be guaranteed, and should also take care that they do not for much inferior Governors, pay higher prices than those shown in the above list. We guarantee the Judson Governor will do all any other Governor can do, and in Accuracy and Durability—the main essentials—we guarantee it shall do more.

JUNIUS JUDSON & SON, Rochester, N. Y.

The Pratt & Whitney Co.,
Hartford, Conn.



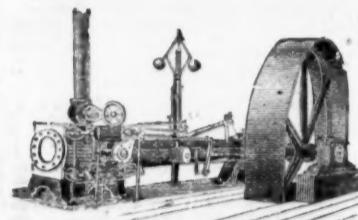
Drop Hammers

Of recently Improved Construction. Pony Trip Hammers, Blacksmiths' Sheaves, Broaching and Stamping Presses, Iron Shop Cranes, Machinists' Tools, Gun and Sewing Machine Machinery. Made to order Gray and Charcoal Iron Castings of all styles and sizes not exceeding 15 tons weight, (making patterns if desired). Furnish Clamp Pulleys of light patterns, cut gears in a superior manner, &c., &c.

CORLISS STEAM ENGINE.

The Best in the World for Economy in Fuel and Cost of Running.

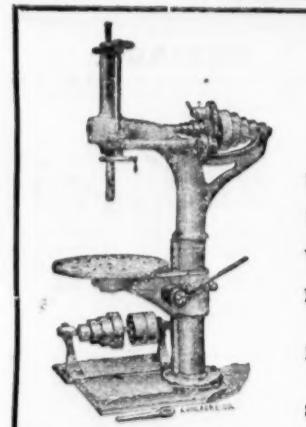
BUILT BY



Robert Wetherill & Co.,
Chester, Pa.,
Engineers, Machinists, Founders,
And BOILER MAKERS.

Stationary Engines, Shafting, Mill Gearing,
Hoisting Machines, Improved Piston
Packing and Machinery.

Special attention given to Boring Ports and Cylinders.



THORNE, DeHAVEN & CO.

21st Street, above Market,
PHILADELPHIA.

DRILLING MACHINES.

PORTRABLE DRILLS. Driven by power in any direction, self-feed and convenient adjustment.

RADIAL DRILLS. Self-feed—large adjustable box table—separate base plate, every convenience.

VERTICAL DRILLS. Self-feeding—new and improved designs.

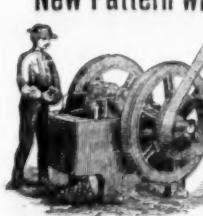
MULTIPLE DRILLS. For boiler work, etc., 2 to 20 spindles, fed and returned by power or hand, together or separately.

HORIZONTAL BORING AND DRILLING MACHINES. For large pieces—with boring head, adjustable, vertically and horizontally.

SPECIAL DRILLS. For special work. Gun Blank Drills, Coal Drills, &c., built to order.

BLAKE'S PATENT STONE & ORE BREAKER.

New Pattern with Important Improvements & Abundant Strength



For reducing to fragments all kinds of hard and brittle substances, such as STONE for making the most perfect MACADAM ROADS, and for making the best CONCRETE. It breaks stone at trifling cost for BALLASTING RAILROADS. It is extensively in use in MINING operations, for crushing

IRON, COPPER, ZINC, SILVER, GOLD, and other ORES. Also for using Quartz, Flint, Emery, Corundum, Feldspar, Coal, Barites, Manganese, Phosphate Rock, Plaster, Soapstone, &c. For Illustrated Circulars, and particulars, address,

BLAKE CRUSHER CO., New Haven, Conn.

A Written Guarantee given with our Pumps.

ENTERPRISE HYDRAULIC WORKS,

Fan Blowers,

Piston

Blowers,

"FOULDS"

Patent Water

Elevator.

2218 & 2220 Race Street, Philadelphia.

2218 & 2220

Machinery, &c.

THE

Shapley Engine

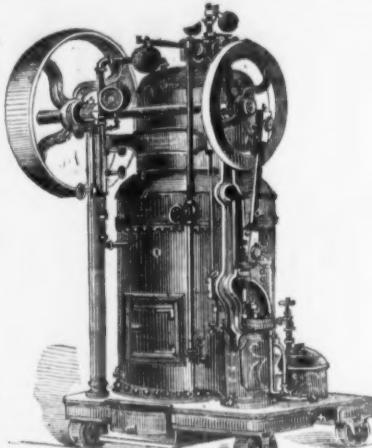
Patented Feb. 10, 1874.

COMPACT,
PRACTICAL,
DURABLE,
ECONOMICAL.
\$200.00.Cheaper than any Engine offered
of the same capacity.

MANUFACTURED BY

SHAPLEY & WELLS.
Binghamton Iron Works,

Binghamton, N. Y.

Manufacturers of Steam Engines, Boilers, Water Wheels, Circular Saw Mills and
Mill Work generally.**Ludlow Valve Mfg. Co.,**

OFFICE AND WORKS:

938 to 954 River St. & 67 to 83 Vail Ave., Troy, N. Y.,

VALVES(Double and Single Gate, $\frac{1}{2}$ in. to 48 in.—outside and Inside Screws, Indicator, &c.)
for Gas, Water and Steam. Send for Circular.

Also FIRE HYDRANTS.

**PORTABLE PIPE AND BOLT
Threader and Cutter**

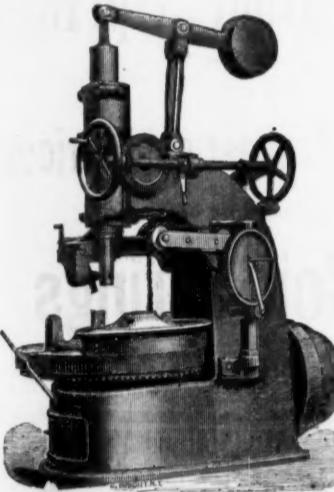
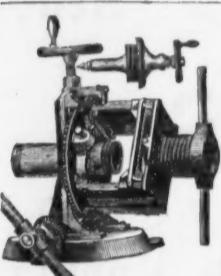
ADDRESS.

EMPIRE MFG. CO., 48 Gold Street, N. Y.

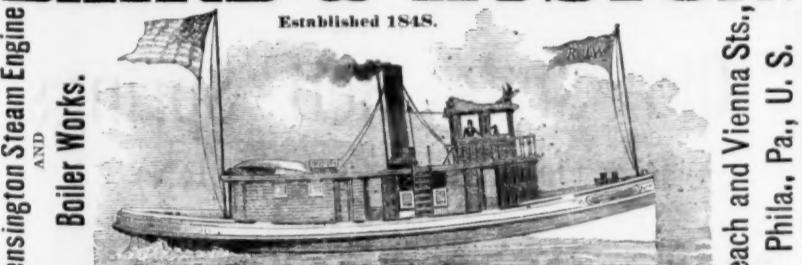
For Sale by

REDFIELD, HOWEN & WALWORTH CO., Chicago, Ill.; BULL & CO., Indianapolis, Ind.; MCHENRY & CO., Cincinnati, O.; LOVEGROVE & CO., Philadelphia, Pa.

RENTIER & MALLORY, Baltimore, Md.; BEWELL & TOWLE, Boston, Mass.; BAHM & HUNTER, Richmond, Va.; JOSHUA HENDY, San Francisco, Cal.

**NEW-YORK STEAM ENGINE CO.**
MACHINISTS' TOOLS
ALL DESCRIPTIONS
CHAS. A. CHEEVER, Pres't. No. 98 CHAMBERS ST.
GEO. Q. DOW, Sec'y. NEW YORKWe have the best and most complete assortment of
MACHINISTS' TOOLS,
in the country, comprising all those used in Machine, Loco-
motive and**R. R. REPAIR SHOPS.**We make a specialty of manufacturing
Gear Wheels of all Descriptions,
which are made absolutely perfect, with Patent Gear
Molding Machine.
For Photographs, Prices and Description, etc., address
N. Y. STEAM ENGINE CO.,
98 Chambers Street, New York.**BAIRD & HUSTON.**

Established 1848.

Builders of STEAM TUGS, STEAM YACHTS, RIVER STEAMERS, &c.
MARINE (High or Low Pressure)

Stationary, Hoisting & Portable Engines & Boilers. Propeller Wheels.

Steam Pumping Machinery

OF EVERY DESCRIPTION.

PHILADELPHIA HYDRAULIC WORKS, Cor. Evelina & Levant Sts., PHILA.

Send for Descriptive Price List.

STURTEVANTPressure Blowers, Fan Blowers
and Exhaust Fans.**10,000 SOLD IN SIX YEARS.**

SEND FOR ILLUSTRATED CATALOGUE.

B. F. STURTEVANT, 72 Sudbury Street,
BOSTON, MASS.

Machinery, &c.

Machinery, &c.

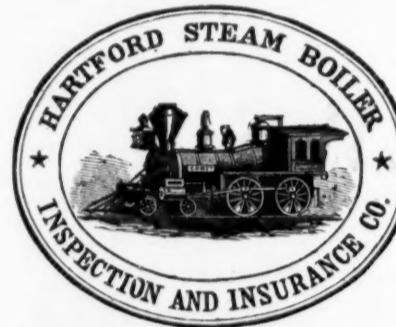
Established 1848.

WM. SELLERS & CO.,

1600 Hamilton Street, PHILADELPHIA.,

Engineers, Iron Founders and Machinists.**RAILWAY SHOP EQUIPMENTS.**Our Steam Hammers, Lathes, Planers, Drills and Bolt Cutters
Are of Improved and Patented Construction.**Railway Turning and Transfer Tables,
SHAFTING & MILL GEARING, a specialty.****Pivot Bridges.****GIFFARD'S INJECTOR--IMPROVED, SELF-ADJUSTING.**

FAIRMOUNT MACHINE WORKS,
Office, 2106 WOOD St., Philadelphia.
Manufactures as Specialties
POWER LOOMS,
SPOOLING, BEAMING, DYEING and
Sizing Machines.
PATENT BOBBIN WINDING MACHINES
wind direct from
hank or skein to shuttle bobbin.
SHAFTING
With Patent Adjustable self-oiling Bearings,
Adjustable Self-Oiling Hangers,
8, 10, 12, 15 and 18 in. drop,
Ball and Socket Self-Oiling Pillow Blocks,
Pulleys, from 4 inch to 10 feet in diameter.
Pulleys made in two parts,
any size required.
SELF-ACTING WOOL-SCOURING MACHINES,
LARD and PARAFFINE OIL PRESSES.
Improved
Power Hoisting Machines.
Machine and Foundry Work in all
their branches.
Plans taken, and Factories fitted out com-
plete with shafting and Gearing
Send for list of Pulleys, &c.
THOMAS WOOD.



Issues Policies of Insurance after a careful Inspection of the Boilers

COVERING ALL LOSS OR DAMAGE TO

Boilers, Buildings and Machinery,

ARISING FROM

STEAM BOILER EXPLOSIONS.

The Business of the Company includes all kinds of STEAM BOILERS;

Full information concerning the plan of the Company's operations can be obtained at the

COMPANY'S OFFICE, HARTFORD, CONN.,

or at any Agency.

J. M. ALLEN Pres. W. B. FRANKLIN, Vice-Pres. J. H. PIERCE, Sec'y.

Board of Directors:

J. M. ALLEN, President.
LUCIUS J. HENDEE, Pres't Aetna Fire Ins. Co.
FRANK W. CHENEY, Ass't Pres't, Cheney Brothers
Silk Manufacturing Co.
CHARLES M. COOPER, of Beach & Co.
GEORGE H. HILLIPS, of Adams Express Co.
GEO. M. BARTHOLEMEW, Pres't Amer. Nat'l Bank.
RICHARD W. H. JARVIS, Pres't Colt's Fire Arms
J. M. KENNEDY, Pres't Aetna Life Ins. Co.
THOMAS O. ENDERS, Sec'y Aetna Life Ins. Co.
LEVERETT BRAINARD, o Case Lockwood & Bratt

and

WM. B. BEMENT, of Wm. B. Bement & Co., Phila.
S. M. M. TUCKER, of Morris, Tucker & Co., Philadelphia.
C. W. GREENLAND, Pres't, Dwight Manufac'g Co., Boston.

and

WILLIAM C. ADAMS, of Biedler, Adams & Co., Philadelphia.

and

WM. B. BEMENT, of Wm. B. Bement & Co., Phila.

and

S. M. M. TUCKER, of Morris, Tucker & Co., Philadelphia.

and

C. W. GREENLAND, Pres't, Dwight Manufac'g Co., Boston.

and

THOMAS H. BABCOCK, Manager,

New York Branch, No. 1 Park Place.

THE AMERICAN DREDGING CO.**BUILDERS OF STEAM DREDGING MACHINES,
GUNPOWDER PILE-DRIVERS, &c.**

CONTRACTORS FOR

IMPROVING RIVERS AND HARBORS,

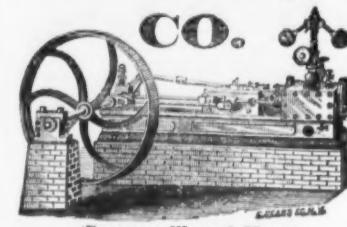
EXCAVATING CANALS,

RECLAIMING AND FILLING LOW LANDS,

PILEING FOR FOUNDATIONS, PIERS, Etc.

Offices, No. 10 South Delaware Ave., Philad'a.

Machinery, &c.

UTICA**Steam Engine**

(FORMERLY WOOD & MANN.)

STATIONARY & PORTABLE

STEAM ENGINESThe best and Most Complete Assortment in
the Market.These Engines have always maintained the very highest
standard of excellence. We make the manufacture of
Engines of every size and power, specially.We have the largest and most complete works in the country
with machinery specially adapted to the work.We keep constantly in process large numbers of
engines, from 10 to 1000 horse power, and on
the shortest notice, we build Engines specially adapted to

to Mines, Saw Mills, Grist Mills, Tanneries, Cotton

Gins, Threshers and all classes of manufacturing.

We make the manufacture of saw Mill Outfits a
special feature of our business, and can furnish complete
outfits for any size of Mill.

Our aim in all cases is to furnish the best machiner

in the market, and work absolutely unequalled for de-

sign, economy and strength.

Send for Circular and Price List.

UTICA STEAM ENGINE CO.,

UTICA, N. Y.

LATHES, PLANERS,

and other

Machinists' Tools.

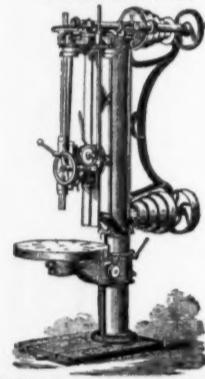
For Sale by

New Haven Mfg. Co.,

NEW HAVEN, CONN

P. BLAISDELL & CO.,
WORCESTER, MASS.,

Manufacturers of the

**'BLAISDELL' UPRIGHT DRILLS,**
And other First-Class Machinists' Tools.**JOHNSON'S PATENT UNIVERSAL
LATHE CHUCK.**We invite attention
to the superior con-
struction of this chuck.Its working parts are
absolutely pro-
tected from dirt
and chips.It is strong, compact and
durable, and will hold
the greatest variety
of work, as the jaws
are adjustable with a
range the full dia-
meter of the chuck.For Price List address,
Lambertville Iron Works, Lambertville, N.J.

Patented Steam and Hydraulic, April 1, 1868.

**EAGLE PACKING,**Of various sizes for **ENGINES** and **PUMPS**,
manufactured by JAMES GLANDING & CO., No.
115 Queen St., Philadelphia. What the proprie-
tors claim for the Eagle Packing: 1. Its general
adaptation to all purposes for which packing is used.
2. Its durability. It will outlast any other article
in use. 3. Its cheapness. It can be furnished to
the consumer at a lower rate than any other packing.

